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Essays in Applied Microeconomics – Examining Land Restitution In A Post-Conflict Context

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This dissertation is submitted on 22nd May 2025 in fulfilment of the requirements for the degree of *Doctor of Philosophy (PhD)* at Trinity College Dublin, the University of Dublin.

Declaration

I, the undersigned, declare that this work has not previously been submitted as an exercise for a degree at this, or any other University, and that unless otherwise stated, is my own work. Chapter 3 is based on a working paper co-authored with Dr Margaryta Klymak.

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Naomi Crowther, 22nd May 2025

Summary

This thesis examines the impacts of restituting land to individuals internally displaced by armed conflict. Colombia experienced a protracted 50 year conflict which led to over 7.7 million internally displaced people and approximatively 8 million hectares of land forcibly taken. Leveraging a novel combination of administrative, census, and geospatial datasets, I present the first causal evaluation of short and mid-term impacts. This research generates a multi-faceted picture of the lives of restituted individuals upon their return. I delve into agricultural investment decisions, household resource allocations towards human capital and labour supply, and social integration into the community. Together, findings suggest that land restitution may constitute a tool to interrupt the deleterious inter-generational cycle displacement triggers.

Chapter 1 exploits the staggered implementation of Colombia's land restitution policy to causally identify impacts on agricultural investment decisions of formerly displaced households. Existing literature on displacement to date has focused on outcomes of displaced people whilst they are experiencing displacement. In this chapter, I provide the first empirical evaluation of behaviour upon returning and formally owning land. I find compelling evidence of increased investment in labour at both the intensive and extensive margins, alongside an increase in animal husbandry investments. As a secondary theme, I challenge the assumption of trust in property rights among a population which has experienced severe undermining of their trust in the state. Specifically, I explore the sensitivity of results commensurate to exposure to violence perpetrated by state-affiliated actors during the conflict. This analysis reveals less dynamic investment behaviour in areas which experienced higher levels of state-perpetrated displacement. In recognition of the disproportionate vulnerability of female-headed households, I examine how investment behaviours differ according to gender of the household head. Female-headed households exhibit more risk-averse investment behaviours than their male counterparts, but leverage land restitution into greater food security, financial stability, and integration into the local market economy.

Chapter 2 builds upon these findings by exploiting the unique nature of Colombia's land restitution law, which mandates joint titling. The land restitution law dictates that both husband and wife must be titled upon restitution. I investigate the mid-term effects of formalising land ownership rights of formerly displaced women on household resource allocation decisions. The existing literature on joint ownership highlights that in the absence of legal compulsion, only the most empowered women will be named on the deed. I contribute to the literature by assessing the mediating effect of a woman's intra-household bargaining power prior to restitution independent of endogeneity concerns over selection bias. I find no conclusive evidence of behaviour changes in household resource allocation. Suggestive findings indicate women and girls in households with

the lowest initial intrahousehold bargaining power may benefit most from formal titling in terms of school attendance and labour supply. Social norms are notoriously sticky and, in the absence of strong enforcement of women's ownership rights, this *de jure* change in women's rights may not yet have fully translated into *de facto* increased bargaining power.

Chapter 3 draws upon the findings of previous chapters and takes a broader perspective of the impacts of land restitution, exploring the effects on social integration in receiving communities. Literature discussing the reception of internally displaced persons in host communities reports frictions, often generated by the economic pressure large influxes of people impose on resources, prices and wages. As illustrated in Chapter 1, land restitution provides a productive asset with which formerly displaced people can contribute to wealth generation and employment in the community. This positive economic impact may alter the zero-sum game mindset evidenced in many studies on the reception of IDPs in host communities. We find evidence of social integration, specifically adherence to organisations which support economic activities in agricultural communities such as associations of producers and farming cooperatives. Moreover, we find increases in reciprocal farm-work – an activity which implies a particularly high level of mutual trust and cooperation.

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Introduction

Displacement of individuals is increasing across the world, the main cause of which is conflict and violence (Internal Displacement Monitoring Center (IDMC), 2024). Research into the effects of forced internal displacement highlights how the experience propels households and individuals onto a downward socioeconomic trajectory. Displacement results in a loss of family members, the depletion of human capital, physical capital, financial capital, but also the dismantlement of community fabric and deterioration of mental well-being (Moya, 2018; Ibáñez and Moya, 2010a). Two inter-connected perspectives emerge through which one can view the importance of evaluating post-conflict policies to best support individuals to live a fulfilled life after forced displacement. One is justice, the other economic growth. One might consider it important to seek ways to mitigate the injustice suffered by people caught in the crossfire of battles over resource accumulation and capital ownership. An alternative motivation is the economic inefficiency resulting from parts of a country's population having unfulfilled potential in terms of human capital and productive capacity. Displacement of people is rising due to geopolitical conflict over resources, hastened by the climate crisis, which is reducing the finite level of natural resources. Given the increasing rates of displacement around the world, governments are increasingly seeking post-conflict policies which enable a sustainable peace.

Ensuring individuals are able to provide for themselves financially, build the human capital of the next generation, and repair the strained social fabric of communities ravaged by conflict, is central to reintegration and rebuilding post conflict. In this thesis, I explore how a policy of land restitution in the wake of armed conflict may inform these three sets of outcomes for formerly internally displaced people. Specifically, I examine the case of Colombia, a country that has lived through a 50 year armed conflict, which at its core stemmed from deeply unequal ownership of land (Ibanez, 2009). Colombia's civil armed conflict led to 7.7 million displaced people and eight million hectares of land seized (Amnesty International, 2014). Peace talks under President Juan Manuel Santos eventually led to a peace agreement signed with the FARC – the main rebel group – in 2016. Shortly beforehand in 2011, Law 1443 was ratified. This law, known as the 'Victim's Law', sought to compensate victims of the armed conflict between 1991 and 2011 and included a specific provision for those who had been internally displaced by the armed conflict to be restituted land. Land restitution encompassed returning land to a claimant, conferring formal deeds to the land, and providing some auxiliary supports such as access to agricultural training, agricultural credit, and agricultural inputs. Importantly, the claimant did not need to have held formal ownership deeds in order to claim land restitution. The claimant could be

the official land owner, a possessor, or an occupier.¹ This policy was implemented across the country in a staggered manner. Whether an area was eligible for official restitution was decided by Colombia's National Security Council based on local security conditions, historical density of dispossession, and conditions of return (Legislativa, 2011, Article 76; Decree 599 of 2012).

The extant literature on land formalisation reveals that, liberated from the uncertain risk of expropriation, households invest in the most productive use of their land, electing more costly perennial crops and more sustainable soil practices (Besley and Ghatak, 2010; Ali et al., 2015; Lawry et al., 2017; Deininger and Chamorro, 2004; Torero and Field, 2005; Deininger and Jin, 2003; Deininger et al., 2011; Dower and Pfutze, 2013; Ali et al., 2014; Do and Iyer, 2008). However, to date, there is no empirical evidence of the impacts of land restitution on agricultural household investment decisions of formerly internally displaced people (IDPs). Fundamental differences between displaced and non-displaced households may affect investment behaviours. Firstly, IDPs have returned to land after a period away, whereas formalised households have been on the land continuously. Secondly, IDPs have seen their trust in the state's monopoly of violence undermined, and in some cases experienced additional erosion of their trust through being displaced directly or indirectly by the state.² Trust in the credibility of property rights is an implicit assumption underpinning the economic literature on land formalisation. It seems incumbent upon researchers to examine whether this pivotal assumption holds among formerly internally displaced people.

In the first chapter of this thesis I examine the agricultural investment decisions of formerly displaced households who have been restituted land in terms of labour inputs, capital inputs, and productivity. I also explore how trust in the state, as proxied by rates of displacement perpetrated by state-condoned actors affect these investment decisions and productivity outcomes. I find evidence of increased labour investments at both the extensive and intensive margins. However, these positive effects are significantly dampened by exposure to state violence.

In recognition that conflict profoundly changes households composition, I undertook heterogeneity analysis by gender of household head. Indeed, 45% of displaced households in Colombia were headed by women as compared with 30% in the population as a whole (Amnesty International, 2014). Women's experience of displacement was often more violent and female-headed households contain fewer adult men. This leaves them more vulnerable to violence and expropriation by force which could generate distinct agricultural investment behaviour. Indeed, I find evidence that female-headed households are significantly less likely to invest in labour inputs after restitution as compared to their male counterparts. However, female-headed households nonetheless exhibit strong evidence of leveraging restitution into greater food security, financial stability, and integration into the local market economy.

¹A land owner has formal documentation of ownership rights over the land. A possessor is defined as a person who believes themselves to be or behaves as the owner of the land, uses it, exploits it, or rents it to others but does not hold formal titles registered with the Public Registry's Office. An Occupier is defined as an individual who lives or exploits unoccupied government owned land, and has done so for a minimum of five years.

²Following the formation of the FARC in 1964, the paramilitary emerged as the state's counter-insurgency response. In 1968 the Colombian government enshrined the legal status of paramilitary groups in law (Amnesty International, 2005). According to the registry of land restitution claims submitted by displaced people between 2012 and 2015, the paramilitary and the state perpetrated almost half of total displacements.

Reversing the loss of human capital accumulation among children and young adults is central to breaking the inter-generational cycle of destitution triggered by displacement. Research into the effects of conflict on educational investment among people displaced, or otherwise exposed to violence, has shown clear evidence of disrupted learning (Leon, 2012; Akresh, 2008; Eder, 2014; Justino, 2012). Exposure at the youngest ages can lead to irretrievable losses (Miguel and Roland, 2011). Mitra and Bang (2021) report that following conflict the human capital accumulation and labour force participation of women falls significantly more than men's. A literature on intra-household dynamics finds that mothers hold particularly strong preferences for investing in their children's education (Galiani and Schargrodsky, 2010; Ngenzebuke et al., 2016; Deininger et al., 2010). In particular, research has found that when mothers experience a positive shock to their empowerment, household resource allocation shifts towards higher human capital accumulation of children, through the mechanism of higher intrahousehold bargaining power (Meinzen-Dick et al., 2019). There is as of yet no literature investigating whether land restitution to IDPs could alter household investment into human capital.

To explore this gap in the literature, the second paper of this thesis exploits a specific provision of Colombia's land restitution law which states that both the husband and wife must be formally named on the property deed. Studying a subsample of married women, I explore whether being formally named on the property title allows mothers to shift household resource allocations closer to their preferences in terms of human capital accumulation of their children. Widman and Hart (2019) illustrate theoretically that if joint formalisation is voluntary, only women with the highest bargaining power will be named on the title. The mandatory nature of this law enables me to explore the mediating effect of a woman's intrahousehold bargaining power prior to formal ownership, isolated from the endogeneity concerns of selection bias. Decisions over household labour supply are another area shown to be sensitive to change in intrahousehold bargaining dynamics (Schling et al., 2023). Therefore, I examine whether female labour force participation is reactive to a positive shock to women's intrahousehold bargaining power. I find tentative evidence that upon being named on the deed, women with the lowest initial bargaining power shift their labour supply towards the paid labour market. These suggestive findings concentrated among the most vulnerable women provide motivation to further explore whether formally naming women amplifies female empowerment, and could attenuate the deleterious intergenerational cycle of displacement on which households are set.

Building social cohesion among the population in the wake of conflict is a fundamental aspect of ensuring a sustainable peace. Animosity between groups represents a particular risk in the aftermath of a civil conflict. During interviews I conducted with program implementers and program beneficiaries in 2019, respondents reported that tensions, initially, emerged within communities due to resentment, jealousy, and mistrust. Program implementers discussed perception among host communities that the restituted had 'left them' to face the hostilities and were now returning with land rights provided. Some restituted individuals reported community members were confused over whether returning households were formerly displaced, or in fact ex-militants who had demobilised. Given the importance of social cohesion and economic integration in agrarian societies, my third paper is based on a co-authored piece which investigates the

impacts of land restitution on social integration. Specifically, we investigate measures of social integration that have ramifications for the economic wellbeing of agricultural households, such as belonging to an association of producers or a cooperative association. We also examine the extent of reciprocal work on restituted farms as a measure that captures both attitudes of former IDPs and those of the community. The sequential nature of reciprocal work requires a level of mutual trust, which denotes a level of acceptance within the community. We find compelling evidence of increased social integration among formerly displaced households who received land restitution, across all the three measures.

This thesis contributes to the conflict literature in two key ways. Firstly, it is the first to empirically evaluate outcomes of IDPs, not whilst they are still displaced, but upon returning to land with formal property rights. Secondly, it uses a combination of administrative and census data to generate a novel dataset and derive estimates pertaining to the entire population of IDPs that were restituted land.

I posit that providing formal ownership of a productive asset is the difference on which land restitution's virtuous cycle hinges. The literature on IDPs finds negative reception from host communities, chiefly driven by large influxes of populations with unmatched skillsets for urban jobs exerting downward pressure on low-skilled and informal wages (Morales, 2018). In contrast, ownership of land enables former IDPs to become productive members of their communities, generating employment and contributing to the dynamism of the local economy by selling their produce as reflected in Chapter 1. Land restitution helps shift the mindset of a zero-sum game in which host communities must compete for finite resources with an influx of IDPs, towards one in which restituted individuals contribute to wealth creation in the local community. This may play a role in the increased social integration and mutual trust exhibited by communities in Chapter 3. The fact that the measures of social integration are also motors of further wealth creation in agrarian communities lends further credence to this mechanism. As such, my research contributes a novel insight to the literature on conflict and local 'out-group' trust. Unlike Cecchi et al. (2016), I find land restitution increases trust in non-kin – exhibited through hiring labour from the local community and engaging in reciprocal farm work.

Moreover, land is not simply a productive asset but one which has strong emotional connotations for people who have experienced forced displacement from their home. The stability land provides alongside the financial independence, seems to contribute to improved psychological wellbeing. Research shows that IDPs experience high rates of depression and PTSD, which correlates with low pro-social behaviours Vinck and Pham (2009); Landwehr and Ojeda (2021). In contrast, my research from Chapter 1 adds to our understanding of welfare in the wake of displacement by revealing that individuals restituted land have significantly higher self-reported quality of life compared to before restitution. This may also be a mechanism underlying improved social integration.

Nonetheless, several shortfalls of the restitution policy emerge from this research. The productive agricultural investment behaviour captured among restituted households seems to be significantly dampened by a lack of trust in the state in certain areas of the country. Restituted households

in areas which experienced greater rates of forced displacement perpetrated by state-affiliated actors behave more circumspectly, in line with mistrust over the credibility of their property rights.³ If this public policy is seeking to reach the most marginalised victims, it may be prudent to identify ways to rebuild trust in the state. In the meantime it may be judicious to position the policy as decentralised and driven by local level entities.

The findings from Chapter 2 indicate that the component of the restitution law which seeks to promote greater gender equality in land ownership may not have been implemented uniformly or effectively. Results suggest that even if restituted women are receiving *de jure* formal ownership of land, this is not translating into *de facto* ownership rights. Literature on joint formalisation of land highlights the crucial role enforcement plays in translating a gender-aware policy into meaningful improvements in women's bargaining power. Only through enforcement will social norms change, and only once social norms change will the credibility of women's ownership rights be built into societal attitudes and behaviours. Social norms can take generations to shift, but policy-makers can and should play a role in ensuring the gender component of this law is implemented and enforced.

Taken together, the findings indicate that land restitution to former IDPs can contribute to a self-augmenting virtuous cycle which helps mitigate the challenges displacement inflicts on individuals, households and communities. However, policy-makers should be conscious of the distinct vulnerabilities which subgroups exposed to conflict face, in order to ensure benefits reach the most disempowered.

The rest of this thesis is structured as follows. Chapter 1 examines the agricultural investment decisions of agricultural households that were restituted land. Chapter 2 investigates the impact formally naming women on land titles has on resource allocation in a post-conflict setting. Chapter 3 explores the social integration of IDPs upon land restitution. The final chapter provides an overview of the findings, offering some concluding remarks and avenues for future research.

³In this thesis, 'state-affiliated actors' comprises the state and members of the paramilitary.

Chapter 1

Effects of Land Restitution on Agricultural Household Investment Decisions in a Post-Conflict Setting

1.1 Introduction

As of the end of 2023, 75.9 million people were living in internal displacement globally, an increase from 71.1 million in 2022 (Internal Displacement Monitoring Center (IDMC), 2024). Conflict and violence triggered the largest number of internal displacements in the Americas (68.3 million) since IDMC records began in 2009, with Colombia and Haiti accounting for 85% of the total. Research has shown that displacement has deleterious effects on the individuals displaced through loss of human capital, loss of financial capital and deterioration of mental wellbeing (Ibáñez and Moya, 2010b); Becker and Ferrara (2019a); Ruiz and Vargas-Silva (2015a); Bauer et al. (2013) – all challenges which perpetuate the transmission of inter-generational disadvantage. Increasingly, governments are seeking to put in place institutions and policies which set the foundations for a sustainable peace and reintegrate warring factions within society. Land is often a key point of contention in the eruption of civil conflict and, as such, a fundamental determinant of post-conflict policymaking. However, displaced households face distinct challenges which may dictate distinct investment responses to those found in traditional economics property rights literature. As of yet this remains unexplored empirically.

Therefore, in this chapter, I explore the impact of property rights on agricultural outcomes of formerly displaced households who were restituted land. The extant literature on formalisation finds that, liberated from the uncertain risk of expropriation, households invest in the most productive use of their land, including more costly perennial crops and more sustainable soil practices (Besley and Ghatak, 2010; Ali et al., 2015; Lawry et al., 2017; Montero, 2022; Deininger and Chamorro, 2004; Torero and Field, 2005; Deininger and Jin, 2003; Deininger et al., 2011; Dower and Pfutze, 2013; Ali et al., 2014; Do and Iyer, 2008). The literature also finds formalised property rights reduce the need for land-guarding tactics and free household members to engage

in more productive pursuits such as human capital accumulation and off-farm employment (Zhao et al., 2022). Finally, the literature on formalisation finds that property rights facilitate gains from trade, allowing for a more efficient allocation of resources within the economy through, for example, land rentals (Chen et al., 2023). Underlying all the hypothesised and evidenced household behaviour changes in this literature, is the implicit assumption that formalised households trust that their newly acquired land rights will be protected and enforced by the state. Although the field of empirical work relating armed conflict and political trust is relatively nascent – unlike the field relating armed conflict and social trust – a recent meta-analysis by Fiedler (2023) suggests a strong negative correlation. Perceptions of government ineffectiveness are a central reason for loss of trust, and instances of state involvement as an actor in armed conflict curtail trust further (Fajardo-Steinhäuser, 2023). As such, this paper contributes to our understanding of how households behave when they are given land rights but are uncertain of their enforcement due to previous experiences of forced displacement.

The 50-year armed conflict in Colombia was predominantly fought between the FARC (Revolutionary Armed Forces of Colombia) – Colombia’s largest guerrilla group – and the paramilitary. The FARC was formed in 1964 as an armed force which adhered to a Marxist ideology. The paramilitary emerged shortly thereafter as the state’s counter-insurgency response. Both FARC and paramilitary actors committed atrocities against civilian populations during the civil conflict in Colombia, but the paramilitary have at times done so under the explicit or implicit order and protection of the state (Amnesty International, 2005). In 1965 the Colombian government ratified Decree 3398 which allowed the military to create groups of armed civilians to conduct counter-insurgency operations. The decree was enshrined into law in 1968 thereby legalising the paramilitary. The history of the paramilitary in the armed conflict underlines how Colombians may perceive them to be acting at the behest of the state.¹ Households displaced by paramilitary actors may believe that the state was the true impetus behind their displacement. As such they may have significantly less trust in a land restitution policy administered, and overseen by the state. I create a novel dataset to exploit the quasi-exogenous geospatial border of Colombia’s land restitution policy implementation, alongside propensity score and nearest neighbour matching to evaluate the impacts of land restitution on agricultural investment.

This paper posits that investment behaviours in response to land restitution may be distinct from those traditionally linked to property rights for two main reasons. First, whereas traditional property rights formalise ownership of households who are on their land, the restituted households have been off it for extended periods of time. Therefore, in the short-run upon returning, may face a period of acclimatisation which could impact agricultural production decisions. The distinct challenges facing returning IDPs may, in the short-run, limit their productivity and render them reticent to invest in productive inputs. Second, the restituted household has experienced a fundamental undermining of their trust in the state’s capacity to protect their property rights.

¹By the late 1980s the paramilitary had become a powerful structure with the ability to mobilise across activities at the national level. In response to this development, the state issued Decree 3398 in 1989 which outlawed the paramilitary through criminalising armed civilian groups. Subsequent government policies attempted to reverse this suspension, and legalise them anew through acts such as Order 200-05-91 in 1991, Decree 2535 in 1993, and Decree 356 of 1994. The latter created a special private security service known as CONVIVIR that was charged with providing security in high-risk areas of Colombia.

In other words, having witnessed the state’s monopoly of violence undermined, IDPs sustain uncertainty regarding whether the state is able to enforce their land rights upon restitution. Weak institutions are associated with risk-averse investment behaviours (Acemoglu et al., 2003; Bluhm et al., 2020). Moreover, a subsection of the displaced population in Colombia has experienced an additional layer of loss of trust in the state – approximately 40% of land restitution claims made between 2011 and 2015 reported that the state or a perceived state-condoned actor displaced them from their land. These households may lack trust that, even if the state were able to protect their land rights, it would in fact choose to do so. If this is the case, investments should reflect low trust in the credibility of property rights among restituted households. Areas which experienced high levels of displacement by a state-affiliated actor should reflect particularly pronounced uncertainty. This analysis uses data collected in the immediate aftermath of the first two years of land restitution, so, all things equal, uncertainty should be at its most acute in this short-run period.

Colombia’s protracted armed conflict significantly altered national household composition. While 30% of households in Colombia are female-headed, this figure increases by 50% among displaced families due to casualties of war (Amnesty International, 2014). Female-headed households face a slew of systemic disadvantages particular to living in a patriarchal society, including in their access to productive resources (Quisumbing and Pandolfelli, 2010). Post-conflict contexts exacerbate these barriers (Klugman and Mukhtarova, 2020). I undertake heterogeneity analysis of the effects of land restitution among female-headed households to explore the extent to which these distinct challenges impact investment behaviour.

This research examines whether the expected agricultural investment behaviours predicted in the property rights literature in terms of labour, capital, and agricultural yields, materialise among households who are restituted land following internal displacement. I also explore whether trust in the state, as proxied by the actor who perpetrated the displacement, significantly alters investment behaviour, alongside heterogeneity impacts by gender of household head.

Both the treatment and control groups in this paper are constituted of households that suffered internal displacement during the armed conflict. The treatment group consists of households who received land restitution through the government’s 2011 Victim’s Law and formally own their land. The control group consists of households who have not been restituted land, but who have returned and report owning land. Colombia’s National Statistics Office (DANE) stated that in 2012, 59% of landholders had no titles (Departamento Nacional de Planeación, 2015), despite many claiming that they ‘own’ land. As such many households in the control group do not hold the official title deeds. The construction of the treatment and control group aims to isolate the impact of land restitution, which consists of returning land to a formerly displaced person, conferring formal property rights of that land and access to additional support inputs such as agricultural inputs, agricultural training practices and support in accessing agricultural loans. To isolate the impact of receiving land restitution from the additional supports, I control for whether the household applied for agricultural credit, whether the household received training in agricultural best practices and the input levels of the four preponderant crops in Colombia –

cassava, maize, plantain and coffee.²

This paper finds evidence that land restitution is associated with more dynamism in labour and animal husbandry investments as well as improvements in self-reported quality of life. Specifically, the probability that a household employs outside labour to work permanently on their farm increases by five percentage points, which represents a 18% increase from the control mean. The intensive margin of labour – the percentage of permanent workforce comprised of hired labour – also increases by four percentage points, or a 19% increase from the control mean. As hypothesised, investments are significantly more muted in areas which experienced greater rates of displacement by state-affiliated actors. The increases in labour inputs at both the extensive and intensive margins, and animal husbandry, are dampened by the rate of displacement perpetrated by state-affiliated actors. I posit this is indicative of greater mistrust in the enforcement of their recently gained property rights.

Heterogeneity analysis suggests gendered responses to land restitution. Female-headed households are less likely to hire outside labour upon restitution than male-headed ones, but despite their different workforce composition they show higher maize yields and higher integration into the local economy (selling their produce at market and to local commerces). These results indicate land restitution may be a particularly powerful tool to reintegrate these disproportionately vulnerable households.

Overall results suggest that land restitution supports productive investment behaviours of former IDPs, but, at least in the short-term, trust in the credibility of property rights is not uniform. This indicates an empirical literature particular to land restitution provided to displaced people, which takes into account the distinct challenges they may face upon returning could serve both citizens and the government. The contribution of this paper is threefold. First, I undertake the first impact evaluation of agricultural investment behaviours of formerly displaced people upon receiving land restitution. Second, I investigate the mediating role of trust in the enforcement of property rights as proxied by exposure to state-condoned displacement. Third, I examine the distinct agricultural investment behaviours of female-headed households upon receiving land restitution.

The rest of the paper is structured as follows. Section 1.2 presents an overview of the land restitution policy, Section 1.3 describes the data, Section 1.4 outlines the empirical methodology, Section 1.5 discusses the results, and Section 1.6 offers concluding remarks and avenues for future research.

1.2 Land Restitution – Policy and Practice

The land restitution policy under study in this paper originates in Law 1448, the ‘Ley de las Víctimas’ or ‘Victim’s Law’. The law was ratified in 2011 and bestows the right for individuals,

²García-Godos and Wiig (2018) and my own qualitative research both indicate that the auxiliary inputs were inconsistently provided. Formal land restitution is the single consistent component of the land restitution policy. Given the inconsistent implementation of the extraneous inputs the main analysis focuses solely on the impact of the land restitution. Results for the restitution ‘package’ are provided in the appendix as input to a public policy appraisal of the program.

who were displaced or forced to abandon their land through the armed conflict, to be returned land and conferred formal property rights (Legislative, 2011, Article 72). The land restitution policy is part of a comprehensive reparation program which seeks to provide formal property rights and improve the socioeconomic conditions of the formerly displaced individual, enabling them to live a more dignified life.³ Importantly, an individual does not need to have had formal property rights prior to displacement to benefit from the land restitution policy – if they meet the burden of proof (described below), they will be entered into the program. The implementation of claims is happening in a phased manner. Whether an area is eligible for official restitution is decided by Colombia's National Security Council based on local security conditions, historical density of dispossession, and conditions of return (Legislative, 2011, Article 76, Decree 599 of 2012). Successful applicants obtain land restitution as well as preferential access to agricultural credit and training programs. The applicant can be restituted their exact land or another land parcel of the same value. The amount of land restituted is never less than the Unidad Agrícola Familia (UAF), which is deemed the minimum area needed to live off the land. The law provides for preferential treatment of applications lodged by female-headed households, in terms of prioritised processing of claims, and fast tracking claims to the judicial stage. The law also includes support from public forces to expedite the return of women victims to their land. Moreover, the law is pioneering in terms of gender equality for married women. The property title must include not only the name of the claimant, but also that of his/her spouse/partner at the moment of dispossession, regardless of whether they still live together (García-Godos and Wiig, 2018). The law does not obligate the beneficiary to return and live on the land. However, article 101 of Law 1443 mandates that the restituted land cannot be sold for a minimum of two years after receipt (Legislative, 2011).

García-Godos and Wiig (2018) detail the land restitution process. I complemented the desk research with several in-person meetings with key actors involved in the lifecycle of the land restitution policy. This enabled me to gain further in-depth understanding and contextualisation of the key aspects and stages of the policy – from conception to outreach, to implementation and ultimately the lived experience of former internally displaced people. In July 2019 I met with members of the Colombian government charged with directing and overseeing the restitution policy, program officers implementing the policy on the ground, and households who had received land restitution. I also met with policy-makers who advised on issues of rural development and gender during the 2012–16 Havana peace negotiations with the Colombian government.

Drawing upon my interviews, the key steps of the restitution process are summarised as follows. The individual seeking restitution arrives at a land restitution unit (URT) agency or is approached through an outreach program. The individual explains their situation and provides information about the location of their land. This information is discussed by a panel of experts in the agency. There are three types of professionals on the panel – lawyers, social workers and land registry workers. The expert panel meet with the claimant and discuss the case to decide whether it meets the burden of proof to proceed. The criteria are (i) reasonable proof of forced abandonment or displacement due to the armed conflict, (ii) after 1991, and (iii) valid ownership claim. A valid

³The restitution policy includes an array of other provisions such as training in agricultural practices and non-discretionary funding to purchase agricultural inputs.

ownership claim can be official ownership, possession, or occupation.⁴ This latitude in ways an individual can successfully claim a valid relationship to the land recognises that in Colombia many land sales are made verbally and also that, during displacement, documentation relating to land was often lost. It is also a recognition that many peasant farmers are unaware of the steps needed to formalise their ownership.

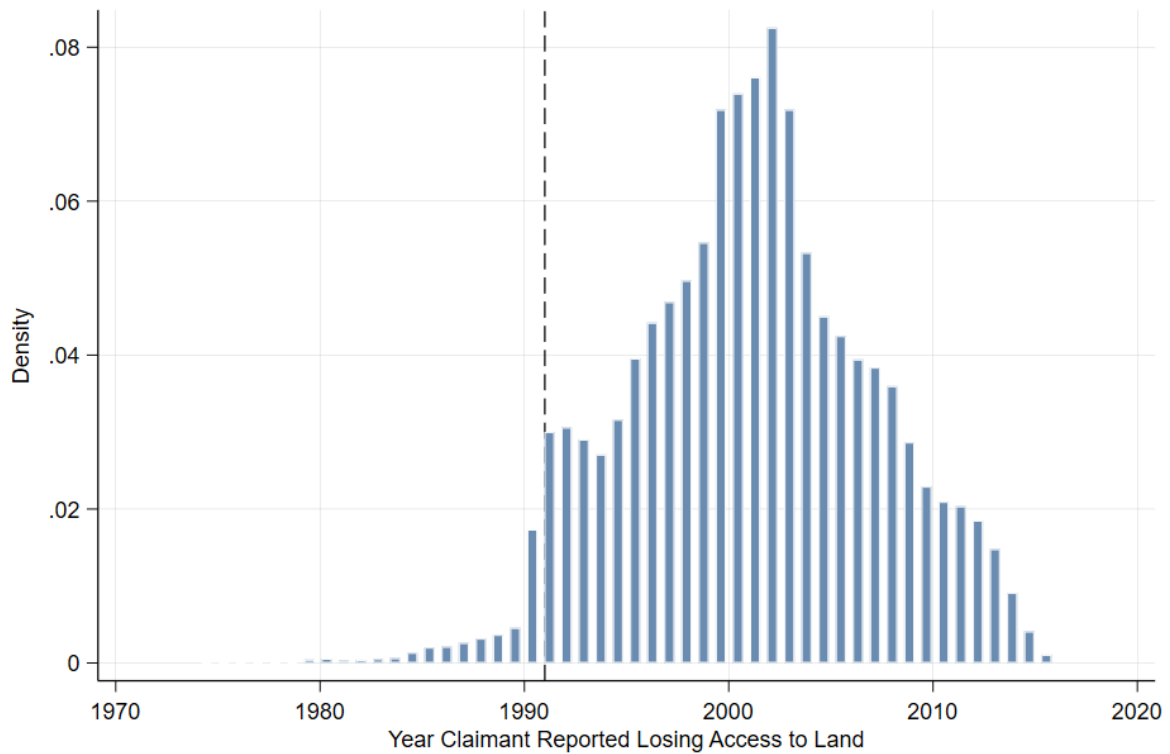
If the land is in an eligible area, i.e. an area the security council deemed open for restitution processing, and the claim meets the criteria, then the agency visits the land. The agency speaks with people in the community, enquires about the individual, the reasons for leaving, and the exact location of the land. The agency collects geo-referenced data of the land under discussion and information on violence in the area from administrative data. The agency registers the request onto the Registro de Tierras Despojadas y Abandonadas Forzosamente (RTDAF). A judge reviews the case and meets with the individual making the request. A judgment is made. Theoretically, the physical restitution of property should take place within three days after the ruling is announced (Legislativa, 2011, Law 1448, Article 100).

As most displacement occurred in rural Colombia, the URT followed a multi-pronged outreach process to remote areas. Only 20% of the URTs cases are ‘walk-ins’ – most are opened following outreach efforts to local areas during which URT employees sensitise the population to the land restitution application. The agency contacted social leaders in eligible communities through a liaison officer designated in each town hall. The URT was in frequent contact with the *Personaria* – an office of the Attorney General’s Office that charged with upholding human rights – to create communication outreach programs to inform rural areas of the restitution process. Members of the URT then visit remote areas as they become eligible to disseminate information about the restitution process. Upon entering an eligible area, the URT agents talk to local leaders and townhall representatives, and collect information on historic violence and conflict in the community. Two information-gathering techniques are used: ‘Social Cartography’ which refers to a spatial map designating where the armed groups were active in the area, alongside types of crops, etc; and a ‘Timeline’ which consist of a temporal map of the conflict in the area. This is the stage at which the agency gathers information with which to triangulate the proof provided by the claimant.

In order to provide a background on the practical implementation of the land restitution policy in Colombia, I obtained a dataset of the 87,117 claims officially submitted to the land restitution unit between 2011 and 2015, from the Santos administration. The dataset is at the individual-level and provides information on the socio-economic profile of the applicant, the alleged actor who perpetrated the displacement, the municipality in which the land is located, the municipality where the claim was lodged, and dates for each step of the process the applicant has progressed through. This dataset is solely used to describe the policy and is not used in the main analysis

⁴The land owner has formal documentation of ownership rights over the land. A possessor is defined as a person who believes themselves to be or behaves as the owner of the land, uses it, exploits it or rents it to others but does not hold formal titles registered with the Public Registry’s Office. An Occupier is defined as individuals who live or exploit unoccupied government owned land. The individual needs to have been on the land for a minimum of five years.

Figure 1.1: Histogram of Year Claimant Reported Losing Land



Note: Histogram showing the density of displacement per year in Colombia. Variable aggregates instances of land displacement and land abandonment due to the armed conflict. Dashed vertical line denotes the cut-off year 1991 - land must have been lost after 1991 to be eligible for restitution. Source: Dataset of 87,117 land restitution claims received by URT between 2011 and 2015 of which this figure shows the 83,081 non-zero data points.

of the paper beyond one variable – the alleged actor who perpetrated the displacement.⁵

Most applications were lodged by individuals who reported owning the property they were displaced from. However over a quarter reported possessing the land and 15% reported occupying the land. Given that the majority of land in Colombia in 2015 was not formally titled, this suggests that formal owners may be over represented in the process. However, applications from non-owners were in excess of 50% of all claims. This highlights that the policy outreach was capturing a wide array of displaced individuals.⁶ Whereas 74% of men who applied were either married or in a civil union, the majority of women who applied were either widowed, single, or divorced. This has important implications for the composition of female-headed households which I will discuss in the heterogeneity analysis.

Figure 1.1 depicts the density of land lost by year. The bulk of expropriation occurred in the early 2000s. The discontinuity in density on either side of the 1991 eligibility cut-off is due to the

⁵The reason for this is that my main analysis is at the individual-level but this dataset could only be matched at the municipality-level.

⁶It is also possible that individuals did not interpret the question as requiring formal titles in order to declare ownership.

Table 1.1: Average Processing Time per Selected Stage (weeks)

	Open Application	Proof	Admission	Decision	Rejection
Women	46	56	62	84	76
Men	51	60	64	90	81
Disability	49	59	66	97	71
Paramilitary or State	55	66	67	94	83
Guerrilla	42	51	56	80	73

Note: Table provides the cumulative average number of weeks each key stage of the land restitution process takes, per subgroup of applicant. The stages are listed sequentially, beginning with the application initiation and ending with a decision on whether the claim is accepted or rejected. The subgroups included in the table are gender of the claimant, a binary of whether the claimant reported having a disability, a binary of whether the claimant reported being displaced by the paramilitary/state, or finally by the guerrilla. Table is restricted to the 42,325 out of 87,117 claims which were in an area of Colombia made eligible for restitution by 2015. Of these 42,325 claims 57% were in process, 7% were withdrawn, 16% were rejected, and 6% were complete by 2015.

URT only registering claims that met the temporal requirement.⁷ It is notable that a quarter of claims report multiple experiences of displacement, so a non-negligible proportion of people have experienced multiple instances of land related displacement trauma. One fifth of the claims were applied for by one person for two distinct parcels of land.

Only 39,656 (46%) of all claims in this database were for land rendered eligible for restitution by 2015. Claim processing timelines shown in Table 1.1 illustrate that applications lodged by women were processed on average faster, although they were not significantly more likely to be successful than those of men. Claims lodged by individuals reporting displacement by the paramilitary were significantly slower to be processed but no less likely to be successful than non-paramilitary related claims. Finally claims from people seeking land in indigenous reserves or black territories were also slower to be processed.⁸

In terms of the alleged actor of displacement, Table 1.2 indicates that cases of displacement solely attributable to the guerrillas account for 37% of all displacements, while those perpetrated exclusively by the paramilitary or the state represents 30% of all displacements. When I include cases that are jointly assigned to another actor, cases involving the guerrillas increase to 46% and joint cases involving paramilitaries or the state rise to 39%. It should be noted that there is likely a survival bias in the data in the sense that individuals who were displaced by the state or a state affiliated actor may be less likely to trust a land restitution program enacted by the actor who they hold responsible for expropriating it. As such these numbers are likely a lower bound

⁷Of the 87,117 claims only 367 applications were received for land lost before 1991, and 3,989 applications provided no year.

⁸Given that indigenous reserves and Afro-Caribbean populations were disproportionately displaced during the conflict, there is merit in exploring these figures further along a racial dimension. However, those areas were disproportionately less likely to have been made eligible for land restitution by 2015. A simple t-test reveals that only 7% of requests made for land in black territories were in eligible areas as compared to 47% of non-black territories. Similarly, only 11% of land requests made in indigenous reserves were in eligible areas as compared to 46% of non-indigenous reserve land. Therefore, it is not possible to make meaningful inferences along racial lines with the data up to 2015.

Table 1.2: Alleged Actor of Displacement

	Frequency	Percent
Guerrilla	32,390	37%
Paramilitary/State	26,473	30%
Mixed actors	10,173	11%
Missing	18,081	20%

Note: Table detailing the proportion of claims of displacement reportedly due to the guerrilla, the paramilitary/state, a mix of actors (guerrilla, paramilitary/state, BACRIM - criminal gangs, civilians), a fifth of the sample provided no response to the actor of displacement. Source: Dataset of 87,117 land restitution claims received by URT between 2011 and 2015.

estimate of the displacement perpetrated by the state. Indeed, Thomson (2017) found evidence of lower rates of registration for land restitution in areas where government officials were linked to armed groups.

Most municipalities in Colombia experienced forced displacement during the armed conflict – guerrilla displacements were reported in 798 of Colombia’s 1,100 municipalities, and paramilitary displacements were reported in 717. Histograms showing the density of municipality-level displacement by the guerrilla and the paramilitary or state can be found in the Appendix (Figure 1.A.1 and Figure 1.A.2, respectively). Together with Table 1.2 it is apparent that although the guerrillas may have perpetrated more displacements, in the municipalities where the paramilitary were active they wreaked more intensive violence.

1.3 Data

I draw on several data sources for my analysis. Firstly, I overlay shapefiles outlining the areas of Colombia that were eligible for land restitution between 2011 and 2022, with the 2014 agricultural census in order to geospatially locate households. This step enables me identify the control and treatment groups and obtain outcome measures at the individual, household, vereda, and municipality level (DANE, 2014; CERAC, 2014).⁹ Secondly, I use the Conflict Analysis Research Center (CERAC) municipality-level dataset on historical violence from 2000 to 2012, to ensure comparability in past experiences of violence in the treatment and control groups. Thirdly, I use a database of all 87,117 requests for land restitution that the Colombian government received between 2011 and 2015, to create a municipality-level index of the alleged actor of displacement reported by households.

The Victim’s Law was ratified in 2011 and land restitution officially began in 2012. Therefore, households censused in 2014 would have had at most two years on their restituted land. In light of this short-term time frame and given data constraints, I analyse outcomes which households would make immediate decisions about upon restitution, and which enter into the traditional agricultural production function. These include labour inputs, capital inputs and intermediate

⁹The vereda is the geographic administrative unit below the municipality. There are 1,103 municipalities in Colombia and 32,377 veredas. It is frequently a village comprising between 50 and 1200 inhabitants.

inputs relating to crops. Given that economic investment decisions and trust are often correlated with mental well-being, and research has shown that IDPs experience high levels of depression (Moya, 2018), I also include a measure of how restitution affects well-being. Namely, self-reported quality of life compared to five years prior (before receiving land restitution). Table 1.3 provides the name and a brief description of each outcome variable analysed. Table 1.4 describes the independent variables included in the analysis.

The historical violence variable created by CERAC originally included six categories: (i) no conflict, (ii) lightly affected by conflict and conflict ended, (iii) lightly affected and interrupted, (iv) strongly affected and interrupted, (v) lightly affected and persistent, and (vi) strongly affected and persistent. I consolidated the violence data into a binary variable that took the value of 1 if the municipality experienced violence categorised as ‘strongly affected and persistent’, ‘Lightly affected and persistent’, or ‘strongly affected and interrupted’. The measure took the value 0 if the municipality was classified as ‘lightly affected and interrupted’, ‘lightly affected and ended’, or ‘no conflict’.

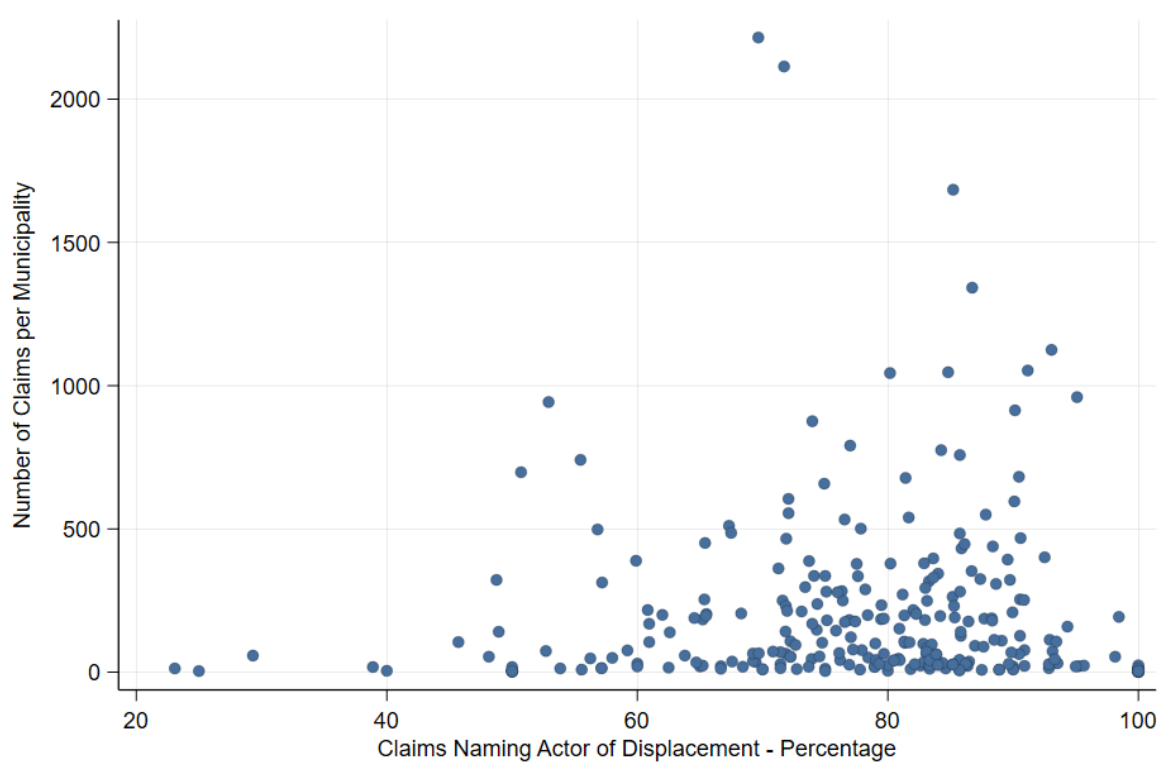
The ‘actor of displacement’ variable is the key variable used to investigate whether trust in enforcement impacts how restituted households make agricultural investment decisions. To generate this variable, I first used the administrative database of claims for land restitution received between 2011 and 2015 which identified the actor reported to have displaced the claimant. Secondly, I grouped the reported actor of displacement into three main categories, based on frequency of occurrence within the data: guerrilla, paramilitary or state, and mixed actors. As a third step, I created three variables, each representing the share of displacement by the given actor over the total number of displacements reported in each municipality. Missing values could bias the construction of this measure if individuals were, for example, less likely to report the actor of displacement if they were displaced by the state or the paramilitary when they applied for restitution through a government program. To investigate this concern I plot the number of land restitution claims per municipality against the percentage of non-missing actor of displacement responses in Figure 1.2. In only nine municipalities do fewer than 50% of claims identify the actor of displacement. Moreover, the total number of claims in these nine municipalities are particularly low – four municipalities had less than 20 claims, and the next three had less than 141 claims. Concern that missing values are biasing the measure is assuaged by these statistics, however, as a robustness check, I re-run the analysis excluding municipalities in which fewer than 50% of claims included a named actor. Results remain robust to the exclusion of these municipalities, and can be found in Tables 1.A.16 and 1.A.17 of the Appendix.

Table 1.3: Outcome Variables

Variable	Description
<i>Panel A: Agricultural Yields</i>	
Coffee, Cassava, Maize: Yield	Continuous variable indicating the yield of each crop produced on farm, in tons per hectare
<i>Panel B: Animal Husbandry</i>	
Bovines	Binary variable taking a value of one if the farm rears bovines, zero otherwise
Other Livestock	Binary variable taking a value of one if the farm rears other livestock, zero otherwise
<i>Panel C: Labour Inputs</i>	
Labour: Extensive Margin	Binary variable taking a value of one if the farm hires outside labour as part of their permanent workforce, and takes a value of zero if it uses only household labour as their permanent workforce
Labour: Intensive Margin	Continuous variable indicating the percentage of permanent workforce comprised of outside labour
<i>Panel D: Capital Inputs</i>	
New Machines	Binary variable that takes a value of one if the farm owns agricultural machinery that is less than five years old, and takes a value of zero otherwise
Number of Machines	Continuous variable indicating the number of distinct pieces of agricultural machinery
<i>Panel E: Measure of Well-Being</i>	
Improved Quality of Life	Binary variable which takes a value of one if the household head reported feeling better about the quality of their life as compared to five years prior. It takes a value of zero if they report their quality of life is the same or worse than it was five years prior

Note: Table describing outcome variables used in analysis including the name, data format, and variable definition. Binary variables have been multiplied by 100 for ease of interpreting results in percentage points. Source: 2014 Demographic Census. The yield calculation is as follows: $\text{Yield} = \frac{(\text{Quantity Harvested} \times \text{kg Equivalence})/1000}{\text{Area Sown (ha)}}$.

Figure 1.2: Scatter Plot of Total Claims by Percentage of Claims Naming Displacement Actor



Note: Scatter of the total number of restitution claims per municipality plotted against the percentage of those claims which included a named actor of the displacement. Source: Dataset of 87,117 land restitution claims received by URT between 2011 and 2015.

Table 1.4: Independent Variables

Variable	Description
<i>Panel A: Household-Level</i>	
Year Displaced	Continuous variable, year household was displaced during armed conflict
Household Size	Continuous variable indicating number of household members
Area of Farm	Continuous variable indicating the size of the farm unit, in hectares (log)
Credit: Applied	Binary variable which takes the value 100 if the household applied for agricultural credit in the previous year, zero otherwise
Training: Agricultural Practices	Binary variable which takes the value 100 if the household received training in agricultural practices in the previous year, zero otherwise
Coffee, Cassava, Maize, Plantain: Input	Continuous variable indicating the quantity of each crop input on farm, in tons per hectare
<i>Panel B: Vereda-level</i>	
Displaced Households	Continuous variable calculated as the total number of households living in a vereda in 2014 which reported experiencing displacement during the armed conflict, divided by the total number of households living in the vereda, multiplied by 100.
<i>Panel C: Municipality-level</i>	
Historical Level of Violence	Binary variable that takes the value of one if the household is in a municipality that experienced high levels of violence during the period 2001 to 2012, zero otherwise.
Paramilitary/State	Continuous variable denoting the number of cases lodged within a municipality about displacement reportedly perpetrated by the state or a state condoned actor, as a percentage of all reports in the municipality
<i>Panel D: Geospatial Variables</i>	
Longitude and Latitude	Continuous variables denoting the coordinates of the farm
Nutrient Availability	Ordinal list denoting the quality of nutrient availability of the soil. Grid-level variable provided at 0.9×0.9 km resolution

Note: Table describing independent variables used in analysis including the name, data format, and variable definition. As soil quality is an essential control in the production function I include ‘nutrient availability’ (Amorin et al, 2020) from the Global Agro-Ecological Zones (GAEZ) modelling framework dataset.

1.4 Empirical Approach

I undertake a multi-step process to identify a valid treatment and control group which involves exploiting the phased implementation of the policy along quasi-exogenous geospatial borders, propensity score matching, and nearest neighbour matching. The treatment group is comprised of households who suffered internal displacement during the armed conflict and who have received land restitution and formal ownership rights. The control group is constituted of households who were also internally displaced through the armed conflict but who have not received land restitution, they report having returned to and owning their land. In this section, I detail the steps of my identification strategy followed by my empirical specification, and present balance checks of my treatment and control households.

1.4.1 Identification Strategy

I define treated households in a sequence of steps. First, I identify the borders of the areas of Colombia that were eligible for land restitution by 2014 using the geospatial coordinates from the contemporary shapefile. Second, I overlay the eligibility borders onto a geospatial map of the 2014 agricultural census. This allowed me to identify the households in the census which were located in areas eligible for land restitution by 2014. Third, using specific questions from the 2014 agricultural census I identify households within the eligibility areas that were displaced by the armed conflict, have returned to their land, and who own their property. This yields 4,543 unique treatment households.¹⁰

I then used the map to identify potential control households, that is to say households who meet the same criteria as the treatment group but who are located outside the eligibility border. In deciding how to identify the control households I considered all linear combinations of return and ownership. I opted for the most conservative definition of the control group in order to provide a set of lower bound estimates and isolate the effect of the land restitution policy.

Nonetheless, given that I am not using random assignment, consideration should be given to the practical threats to my identification strategy. Three key potential sources of endogeneity could confound the results. I discuss them in turn, followed by the steps I took to mitigate them. Each relates to the control households returning to their land after being displaced without the support of the government's land restitution process.

Firstly, the control land could have been located in a less violent area which did not require the government to clear it from paramilitary or guerilla activity. If the control land is in a less violent or dangerous areas, this could also lead to better existing infrastructure, more existing investments, higher socio-economic strata neighbours, better schools etc. in the vicinity. The aforementioned could lead to systematically better outcomes in the control group. However, the resulting bias would lead to an underestimation of treatment impacts.

Secondly, the control households which returned without the help of the government restitution

¹⁰Due to the census questionnaire design it is only possible to identify treated households if one unique household resides on the farm, thus I discard all census responses in which more than one family reside on the farm.

program may have been able to do so because they enjoyed systematically higher human, social, political, or financial capital. Were the roles to be reversed, some households in the treatment may not have been able to return without the government program. Precisely this lack of capital could also be a reason outcomes differ, thus, divergences would not solely be attributed to the formal restitution program. However, this bias would also lead to an underestimation of treatment impacts.

Thirdly, the control group land may not have been occupied by anyone else, perhaps because it was on less desirable soil or in a less desirable location than land in the treatment group. In this case control outcomes may be worse than in the treatment group, unrelated to the formal restitution program, but because of the less advantageous soil or location. This bias would lead to an overestimation of treatment impacts.

To mitigate some of the endogeneity concerns I restrict the control households to ones along the border of the eligibility area. The eligibility borders do not correspond to any other administrative border in Colombia, as they were specifically designated for the land restitution policy by a security council in charge of the policy. These borders were drawn by the security council based on three criteria: local security conditions, historical density of dispossession, and conditions of return. Thus, selecting control households as contiguous to the treated households as possible ensures the control group is likely to have comparable histories of violence and displacement, as well as experience of similar local institutions and geographic landscapes, all of which may be important to mitigate endogeneous bias agricultural investment outcomes. Additionally, I include a control of the historical level of violence experienced in the municipality, to further mitigate concerns of unobservables between treatment and control groups.

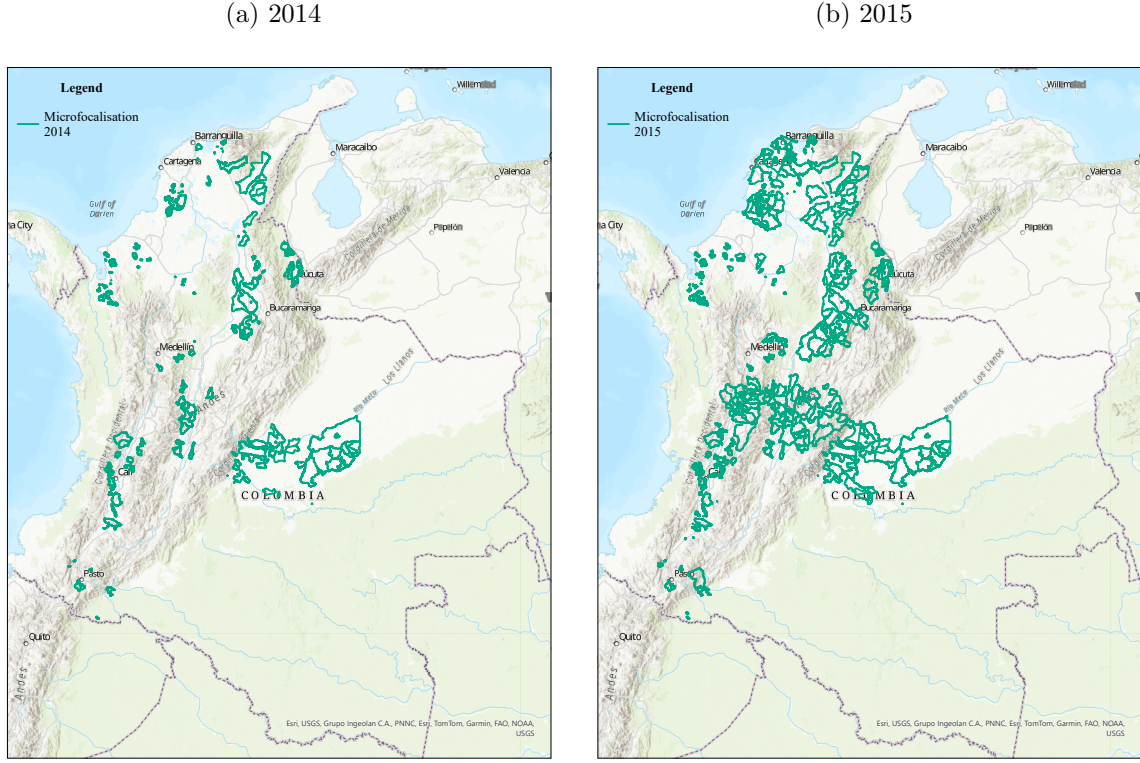
Figure 1.3 shows the progression of the eligibility borders between 2014 and 2015. The two maps make it clear that the control households are on land in 2014 which became eligible for restitution the following year. This use of geospatial contiguity in the determination of treatment and control areas provides support for the exogeneity of 2014 borders and support for a comparable profile of household on either side of the border in terms of historical violence, institutions and local topography.

Distance between each control household and the nearest treatment household is calculated in meters using the Haversine distance rather than Euclidean distance in order to take into account the spherical nature of the earth, and not assume an unencumbered straight line between points. I select the nearest 25 control households to each treatment household. I matched allowing for replacement in order to maximise comparability along unobservables. The trade-off is fewer unique controls are generated. The risk of one control matched with many treatments is that any idiosyncrasies carry a large weight and may bias the results.¹¹

To further refine my control households to be as similar to the treatment households along as many observables as possible, I create a propensity score for each treatment and control combination. The treatment assignment equation is a function of the observable variables which

¹¹Ultimately, I obtain 4,163 unique control matches for the 4,535 unique treatment households, which supports matching without replacement.

Figure 1.3: Evolution of Land Restitution Eligibility Borders



Note: Figures outlining the areas of Colombia which were eligible for land restitution by 2014 and how the borders expanded in the subsequent year 2015. Source: shapefiles from the URT website, manipulated in ArcGIS.

jointly influence likelihood of treatment and outcome values but excludes variables which are affected by the treatment. The treatment assignment equation was run as a probit regressed on age of household head, level of education of household head (separate dummies for no education, primary, secondary, college, and tertiary) and ethnicity (separate dummies for indigenous, black, and other).

Let $D_h = 1$ if household h received the treatment, and $D_h = 0$ otherwise.

$$D_h^* = \beta_0 + \beta_1 \cdot \text{Age}_h + \sum_{j=1}^4 \delta_j \cdot \text{Education}_{hj} + \sum_{k=1}^2 \gamma_k \cdot \text{Ethnicity}_{hk} + \varepsilon_h \quad (1.1)$$

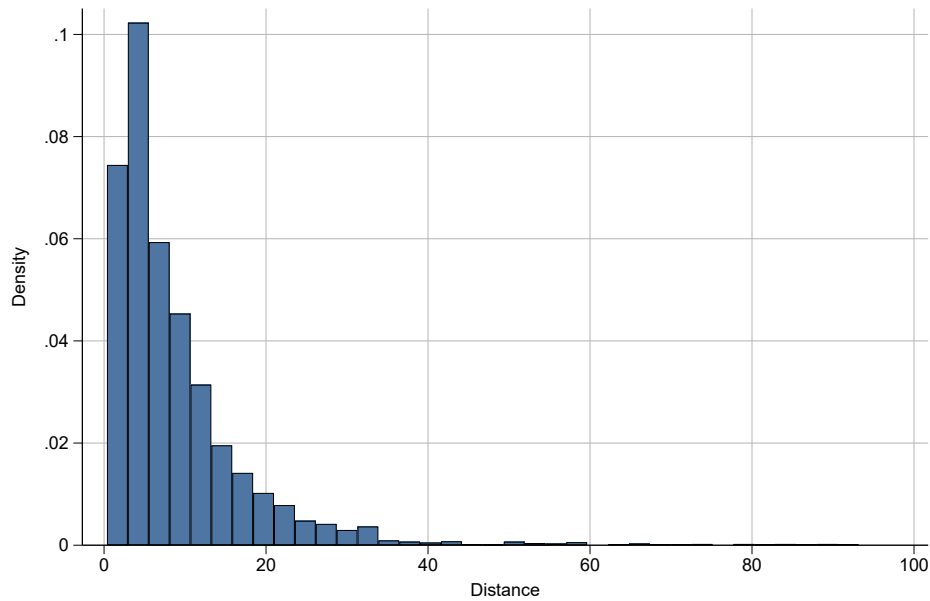
$$D_h = \begin{cases} 1 & \text{if } D_h^* > 0 \\ 0 & \text{otherwise} \end{cases} \quad \text{where } \varepsilon_h \sim \mathcal{N}(0, 1) \quad (1.2)$$

Such that the estimated propensity score is:

$$\hat{e}(X_h) = \mathbb{P}(D_h = 1 \mid X_h) = \Phi \left(\beta_0 + \beta_1 \cdot \text{Age}_h + \sum_{j=1}^4 \delta_j \cdot \text{Education}_{hj} + \sum_{k=1}^2 \gamma_k \cdot \text{Ethnicity}_{hk} \right)$$

Where $\Phi(\cdot)$ is the standard normal cumulative distribution function.

Figure 1.4: Distance of Control Group from Treatment (km)



Note: This histogram plots the distance between treatment households and each matched control household. The measure was constructed in ArcGIS during the propensity score matching exercise. Median distance is 6km, the mean is 9km.

The one-to-one nearest neighbour matching with replacement results in the full 4,543 treated households matched with 4,163 unique control households. Table 1.5 shows the frequency of matches. Over 88% of control households are only matched once, 57 were matched twice, 34 were matched three times. This reassures us that no one household is overly represented. Figure 1.4 is a histogram showing the distance of the control households from treatment group – the median distance is 6 km, the mean is 9 km. This suggests that the geospatial component of the identification strategy is generating matches in meaningfully comparable areas, in terms of local institutions, topography, and culture.

Table 1.6 evaluates covariate balance following the propensity score matching. All standardized mean differences are below 0.02, well within the standard threshold of 0.1, indicating negligible differences between treated and control groups. The variance ratio for age is 1.0227, close to the ideal value of one, suggesting similar dispersion across groups. Empirical cumulative distribution function mean differences do not exceed 0.0042, and the maximum difference is

Table 1.5: Matching with Replacement – Frequency

Times repeated	1	2	3	4	5	6	7	8	9	10	12	13	22
Unique households	4,026	57	34	16	5	6	7	5	2	1	2	1	1

Note: Table describing the number of times each of the selected control households were matched to a treatment household. Opting to match with replacement is a trade-off between quality of the match and potential bias from over-weighting a given observation, however this table suggests the latter is of little concern as 88% of observations are matched once.

Table 1.6: Summary of Balance for Matched Data

COVARIATES	Means Treated	Means Control	Std. Mean Diff.	Var. Ratio	eCDF Mean	eCDF Max	Std. Pair Dist.
Distance (PSM)	0.0388	0.0388	0.0002	0.9999	0.0000	0.0011	0.0002
Age	52.5615	52.4607	0.0069	1.0227	0.0015	0.0037	0.0209
No Education	0.2247	0.2289	-0.0100	—	0.0042	0.0042	0.0132
Primary Edu.	0.6185	0.6177	0.0018	—	0.0009	0.0009	0.0145
Secondary Edu.	0.0850	0.0869	-0.0071	—	0.0020	0.0020	0.0134
Media Edu.	0.0504	0.0462	0.0191	—	0.0042	0.0042	0.0352
Tertiary Edu.	0.0214	0.0203	0.0076	—	0.0011	0.0011	0.0137
Indigenous	0.0154	0.0139	0.0125	—	0.0015	0.0015	0.0125
Black	0.0260	0.0275	-0.0097	—	0.0015	0.0015	0.0097
Other ethnicity	0.9586	0.9586	0.0000	—	0.0000	0.0000	0.0000

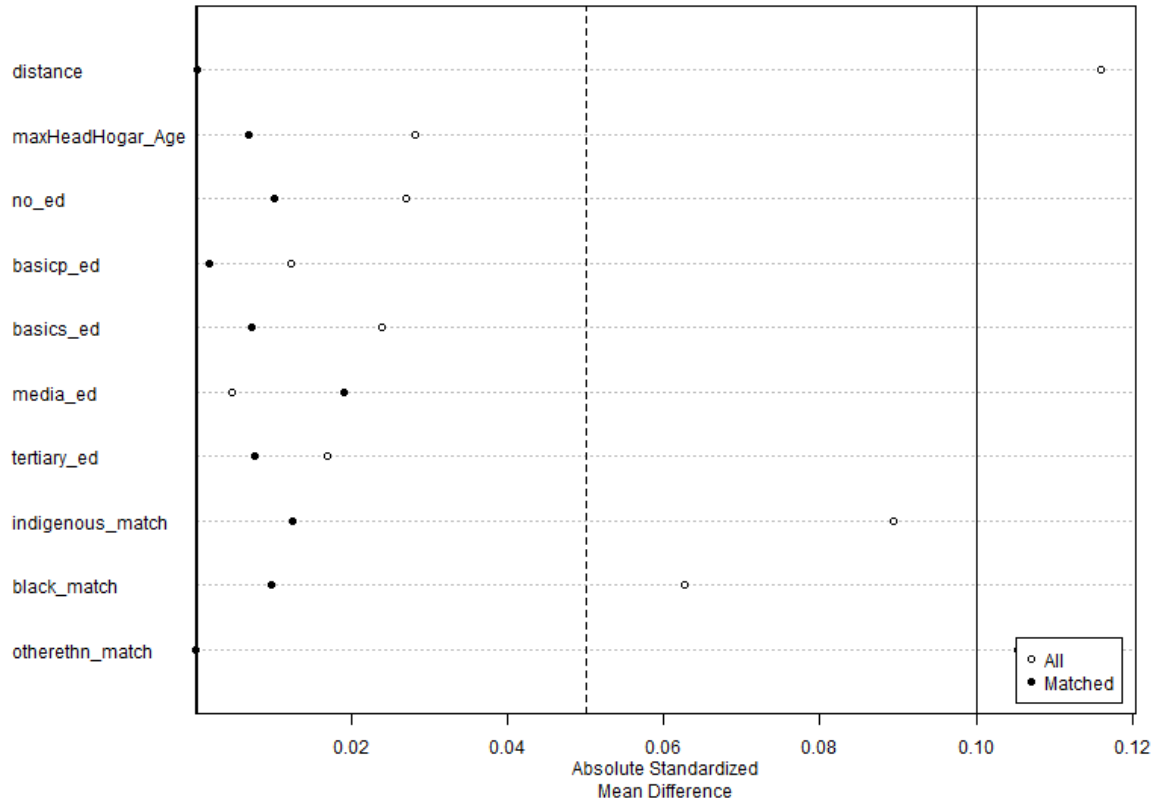
Note: Table summarising the balance achieved through propensity score matching. First column lists the variables on which the match was performed. The top row shows respectively the mean values of treated households, mean values of control households, the standard mean difference, the variance ratio, the average eCDF (empirical Cumulative Distribution Function), the maximum eCDF and the standardised pair difference. Standard mean difference is the difference in the means of each covariate between treatment groups standardized by a standardization factor such that it is on the same scale for all covariates. The variance ratio is the ratio of the variance of a covariate in one group to that in the other. Variance ratios close to 1 indicate good balance because they imply the variances of the samples are similar. The eCDF mean measures the average difference in the cumulative distributions of the matched pairs between the treatment and control groups. It reflects the overall proximity between the two groups in terms of the covariate distribution. The closer the values are to zero, the more closely the covariates of the treatment and control align. The eCDF is the largest difference in the cumulative distribution at any point across the covariate range. The Standardized Pair Distance refers to the average standardized distance between matched pairs of treated and control units, in this table the coefficient approach zero suggesting a successful match.

0.0042, demonstrating that the empirical distributions of covariates are nearly identical across groups. Standardized pairwise distances, all below 0.04, indicate a high-quality match, as values below 0.1 are typically considered strong indicators of good balance in matching literature (Austin, 2009). These results confirm that the matching procedure has effectively minimized pre-treatment differences, reducing bias in the estimation of treatment effects.

Figure 1.5 visually summarises the balance of the final match by plotting the standardised mean differences between the matched and unmatched households. It shows that balance was poor prior to matching, particularly along ethnic lines. It highlights how one-to-one nearest neighbour matching greatly improves balance along all covariates included - most are within a 0.01 threshold and all are within a 0.02 threshold - thresholds which denote successful matching (Austin, 2009).

Figure 1.6 shows a jitter plot of the distance measure, visualising the overall distribution of propensity scores in the treatment and control groups. As I selected 25 nearest controls for each of the 4,543 treatment households, I begin the matching with a dataset of 113,575 combinations. This large sample minimises the pitfalls of attrition associated with exclusion stemming from

Figure 1.5: Summary Plot of Propensity Score Matching



Note: Figure plots the absolute standardised mean difference between the treatment and full control sample (white dots) and the treatment with matched control sample following the propensity score match (black dots). Source: Full sample of 113,575 matched combination treatment and control households

lack of common support between treatment and control options (Rosenbaum and Rubin, 1984). The unmatched control units bar in the plot highlights the large sample from which the matches were drawn. Only the most comparable control households have been selected for each treatment household.

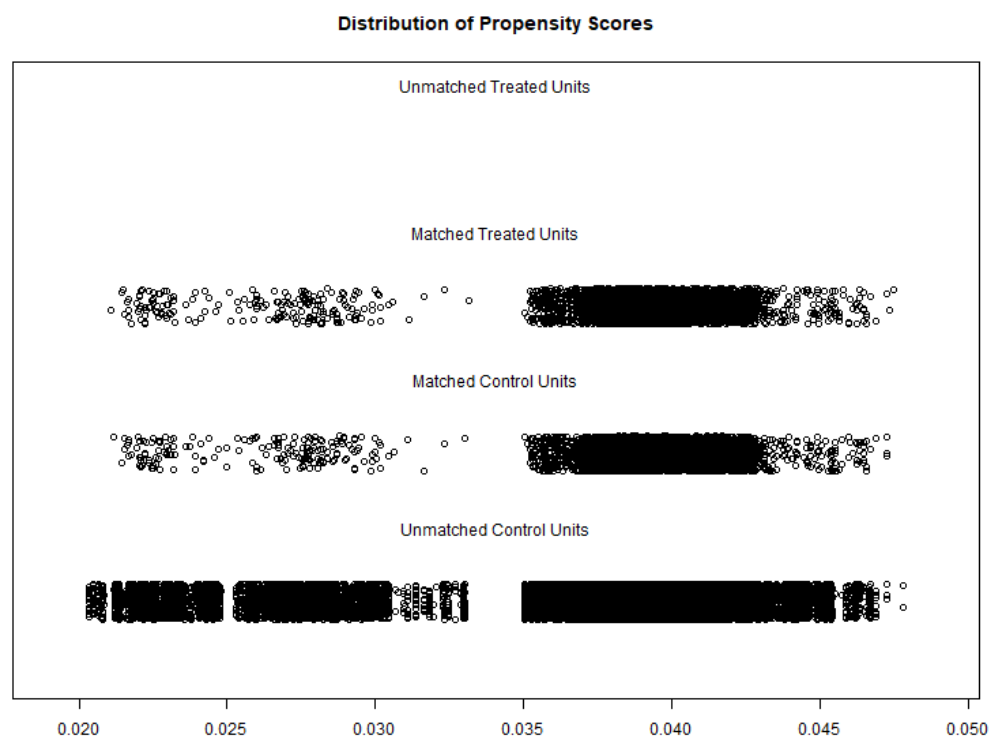
1.4.2 Balance Tests

Table 1.7 provides the results of a balance test which shows that treatment does not significantly predict any of the control variables. The coefficients in Table 1.7 were obtained by running Equation 1.3 – a simple regression which includes the propensity score, municipality-level error clustering and the inverse distance as a weight, and regresses each control variable in turn on the restitution dummy.

$$\text{Independent Variable}_{hvm} = \alpha_0 + \beta_1 \text{Restitution}_{hvm} + \gamma \text{PSM}_{hvm} + \epsilon_m \quad (1.3)$$

I also ran Equation (1.3) to ascertain whether treatment predicts access to potential auxiliary

Figure 1.6: Jitter Plot of Propensity Score Matching



Note: Figure visualising the density of the propensity score distance index of the treatment households, and how the control households selected through PSM track. The top line of the figure is empty since no treated households are unmatched. The second and third lines show the distribution of matched treatment and control households. The bottom row shows the range of unmatched control household propensity scores, highlighting that the 113,575 control match options ultimately enabled a high quality propensity score match.

inputs of land restitution such as training in agricultural practices, support in accessing agricultural credit, and agricultural inputs. Table 1.8 reports the results of this balance test. None of the auxiliary inputs are strongly predicted but applications for agricultural credit, receipt of agricultural credit and training in agricultural practices are significant at the 10% level. It is important to note that Banco Agrario is not statistically significantly more likely to provide credit. The government partnered uniquely with Banco Agrario to implement the land restitution agricultural credit scheme, so if the household is not receiving it from Banco Agrario, the credit was not received through the restitution scheme. Indeed, Bogliacino et al. (2025) discuss how access to credit through the land restitution scheme was curtailed in the early years. Nonetheless, in an attempt to isolate the impact of land restitution I include the binaries of credit application, agricultural practices training and crop inputs as controls in my main specification. Table 1.8 also confirms that displacement allegedly perpetrated by the state/paramilitary within a municipality does not predict treatment. Together, these tests provide compelling evidence in favour of effective balancing, and confidence in the use of propensity score matching to obtain causal inference.

Table 1.7: Balance Test – Control Variables

Variable	Coef.	(S.E.)	Variable	Coef.	(S.E.)
Age of Household Head	0.293	(0.889)	Female Head of Household	-0.001	(0.021)
Education – None	0.005	(0.019)	Area of Land (log)	-0.272	(0.242)
Education – Primary	-0.021	(0.027)	Household Size	-0.405	(0.275)
Education – Secondary	-0.002	(0.011)	Nutrient Availability – 1	0.098	(0.094)
Education – College	0.010	(0.001)	Nutrient Availability – 2	-0.033	(0.049)
Education – Tertiary	0.007	(0.006)	Nutrient Availability – 3	-0.066	(0.101)
Ethnicity – Indigenous	0.005	(0.004)	Year Displaced	0.119	(0.144)
Ethnicity – Black	-0.000	(0.008)	Violence – high	-0.010	(0.097)
Ethnicity – Other	0.005	(0.006)	Displaced Households – vereda	0.699	(4.384)

Note: Coefficient derived from Equation (1.3) which includes as independent variable only the propensity score. Standard errors are clustered at the municipality-level, regression is weighted by the inverse distance between treatment and control. *Displaced households* is the ratio of displaced households by total number of households in the vereda, multiplied by 100. *Nutrient Availability - 1* denotes no or slight constraints, *Nutrient Availability - 2* denotes moderate constraints and *Nutrient Availability - 3* denotes severe constraints.

Table 1.8: Balance Test – Auxiliary Restitution Inputs and State-Affiliated Displacement

Variable	Coef.	(S.E.)
Credit – Applied	3.067	(1.565)
Credit – Received	2.580	(1.478)
Credit – Banco Agrario	1.781	(1.085)
Training – Agricultural Practices	-7.596	(4.123)
Training – Commercialisation Practices	-4.784	(3.431)
Training – Financing	-4.847	(3.460)
Coffee – Input	-0.150	(0.156)
Maize – Input	0.503	(0.441)
Plantain – Input	-0.929	(0.855)
Cassava – Input	-1.977	(2.252)
State/Paramilitary Displacement	0.014	(1.848)

Note: OLS regression including treatment binary, weighting by the inverse distance between treatment and municipality clustered standard errors. *Credit* and *Training* variables are binary that takes the value of 100 if the condition applies and zero otherwise. The *Yield* variables indicate the quantity of each crop input on farm, in tons per hectare.

1.4.3 Empirical Specification

The base model estimated in this analysis is shown in Equation (1.4).

$$\begin{aligned}
 y_{hvm} = & \alpha_0 + \beta_1 \text{Restitution}_{hvm} + \beta_2 \text{Violence}_m \\
 & + \psi' \mathbf{X}_{hvm} + \Gamma' \mathbf{G}_v + \zeta' \mathbf{Z}_k \\
 & + \gamma PSM_{hvm} + \epsilon_m
 \end{aligned} \tag{1.4}$$

Where Restitution indicates whether household h in vereda v and municipality m is treated; Violence is a dummy for the level of historic violence in m ; $\mathbf{X}$, $\mathbf{G}$ and $\mathbf{Z}$ are vectors of household-, vereda-, and geospatial-level controls, respectively; PSM is the propensity score. Standard errors are clustered at the municipality level. y denotes the dependent variable, captured at the household-level.

I use an ordinary least square model which includes a vector of household-level characteristics: year household displaced, log of area of farm, size of household, application for agricultural credit, and receipt of training in agricultural practices. It also includes the vereda-level variable percentage of displaced population, as well as a vector of geospatial-level characteristics – nutrient availability of the soil, longitude and latitude. The base model also includes a measure of historical violence experienced in the municipality during the conflict. I include historical violence in the main estimation as it was a factor considered in the decision of which areas of the country to render eligible for land restitution. Given that this historical violence variable is at the municipality-level whereas my control group is contiguous to the treatment border, differences in historical violence are likely overstated in my analysis, which will lead to more conservative results. I re-run the main estimation excluding the historical violence control and find that results are invariant to its inclusion. See Table 1.A.1 and 1.A.2 in the Appendix. Table 1.9 reports the summary statistics of dependent and independent variables in the control group. The average control group household is headed by a 52 year-old male with primary school education of non-black and non-indigenous ethnicity in a household of just over three members, who was displaced in 2002 and lives in a municipality that experienced high levels of historical violence.

Given the importance of geographical proximity in mitigating endogeneity, I include the distance between the treatment and nearest matched control household as a weight. Specifically, I use the inverse weight of the distance as an analytical weight in the regression specification. This allows me to place a greater weight on control households that are closer to the treatment. This is desirable as these households should be most comparable in terms of local institutions and the intensity of violence and displacement, as mentioned in the endogeneity discussion.

Table 1.9: Summary Statistics – Dependent and Independent Variable Means

Dependent Variable	Mean	(S.E.)	Independent Variable	Mean	(S.E.)
Coffee Yield	0.44	(0.83)	Area of land (log)	10.50	(1.92)
Maize Yield	0.62	(1.68)	Household size	3.21	(1.73)
Cassava Yield	8.09	(35.37)	Year displaced	2002	(3.67)
Plantain Yield	2.73	(4.66)	Violence – High	0.53	(.50)
Bovines	0.36	(0.48)	Nutrient Availability – 1	0.1762	(0.38)
Other Livestock	0.51	(0.50)	Nutrient Availability – 2	0.1764	(0.38)
Extensive Labour	0.27	(0.44)	Nutrient Availability – 3	0.647	(0.47)
Intensive Labour	0.19	(0.35)	Female Head of Household	0.19	(0.39)
New Machine	0.17	(0.35)	Displaced	0.64	(0.28)
Number Machines	1.85	(2.030)	Credit_Applied	0.18	(0.38)
Improv. Quality of Life	0.33	(0.47)	Training_Ag Practices	0.35	(0.48)
			Coffee Input	0.6	(2.05)
			Maize Input	1.3	(6.71)
			Plantain Input	4.9	(16.31)
			Cassava Input	8.6	(37.88)

Note: List of independent variables excludes means of longitude and latitude as these averages hold little meaningful information. *Displaced* is the ratio of displaced households by total number of households in the vereda. *Nutrient Availability - 1* denotes no or slight constraints, *Nutrient Availability - 2* denotes moderate constraints and *Nutrient Availability - 3* denotes severe constraints. *Coffee*, *Maize*, *Plantain*, *Cassava* indicate the quantity of each crop input on farm, in tons per hectare. Source: Agricultural Census 2014

To explore heterogeneity in the actor of displacement I estimate Equation (1.5). The specification includes an interaction term between treatment and the continuous variable denoting the percentage of claims for land restitution within the municipality that identify the paramilitary or state as the perpetrator.

$$\begin{aligned}
y_{hvm} = & \alpha_0 + \beta_1 \text{Restitution}_{hvm} + \beta_2 \text{Violence}_m + \beta_3 \text{State_Para}_m \\
& + \beta_4 (\text{Restitution}_{hvm} \times \text{State_Para}_m) \\
& + \psi' \mathbf{X}_{hvm} + \Gamma' \mathbf{G}_v + \zeta' \mathbf{Z}_k \\
& + \gamma \text{PSM}_{hvm} + \epsilon_m
\end{aligned} \tag{1.5}$$

State_Para_m is the share of displacement claims in municipality m attributed to paramilitary or state actors, while $\text{Restitution}_{hvm} \times \text{State_Para}_m$ is the interaction term between land restitution and displacement by paramilitary/state.

1.5 Results

1.5.1 Main Results

My research question is ‘*What are the impacts of land restitution to formerly displaced people in terms of their agricultural household investment decisions?*’. As a sub-theme I explore whether trust in the state, as proxied by the actor of displacement, can explain any divergence in the investment behaviours of restituted households. Table 1.10 explores labour and capital investment decisions alongside improvements in quality of life and Table 1.11 details effects on agricultural yields. For each of these outcomes the first column contains results of Equation (1.4), and the second column reports results of Equation (1.5), which captures the interaction between treatment and the actor of displacement. Overall, the results suggest former IDP households who receive land restitution increase investment in labour inputs and animal husbandry, and report greater life satisfaction than prior to restitution, relative to the control group. All these investments are dampened by exposure to displacement perpetrated by a state-affiliated actor, suggesting that trust in the credibility of property rights may be impacting investment decision-making behaviour in the short run.

Table 1.11 reveals that the probability a household employs outside labour to work permanently on their farm increases by five percentage points with land restitution, which represents a 19% increase from the control mean. The intensive margin coefficient suggests these households are substituting household labour with outside labour. The proportion of permanent labour made up of outside workforce increases by four percentage points upon restitution, representing an increase of 20% from the control mean. Even if households are returning to communities they were displaced from, the peak of displacement took place in the early 2000’s. Therefore, many restituted households will have been out of their communities for over a decade. As such, the findings of increased hiring of outside workers suggests land restitution may be a tool that mitigates the low trust in ‘out-group’ tendencies captured in existing literature from developing countries (Cecchi et al., 2016).

Table 1.11 also reveals that restituted households are investing in animal husbandry at higher rates. Restituted households were five percentage points more likely to engage in bovine rearing, an increase from the control group in which 14% of farms engaged in this activity, and four percentage points more likely to rear other livestock. The ability of restituted households to increase investment in labour inputs and animal husbandry may contribute to the improvement in self-reported quality of life. Indeed, restituted households report a six percentage point increase in their quality of life as compared to before restitution. This represents an 18% improvement from the control group mean. As such, land restitution may be a powerful tool to mitigate the documented deterioration in mental health precipitated by forced displacement (Moya, 2018; Vinck and Pham, 2009).

The increased labour inputs are in line with a key tenet of the property rights literature that suggests land rights enable a reallocation of resources which build efficiency (Restuccia and Santaaulalia-Llopis, 2017; Chen et al., 2023). Although restituted households were not permitted

to sell their land or rent it out for two years after restitution, this did not preclude using it as loan collateral or altering investment horizons enough to hire outside labour. If this reallocation of resources leads to increased productivity in the mid-term, land restitution may constitute a lever of dynamism into the local economy.

In this study, despite only arriving onto the land recently and potentially being confronted with a new crop to farm, restituted households do not report significantly lower yields. Data on agricultural yields are notoriously noisy, and the standard errors on yield data are extremely large proportional to the variable mean (c.f. Table 1.9). Measurement error in the dependent variable will which could lead to insignificant results. Traditional property rights literature indicates formalisation should lead to increased investment in physical capital. I do not find evidence of this in the main estimation model. This could be an marker of higher levels of uncertainty among the displaced population in the short-term, as compared to the immediate behaviour exhibited in the existing literature by more secure, never displaced, households.

To further investigate the mechanism of different investment behaviours resulting from uncertainty and mistrust in property rights, I interact treatment with an indicator of the extent to which displacement in the area was perpetrated by the state or a perceived state affiliated actor. Columns (2) from Tables 1.10 and 1.11 show that many of the positive effects land restitution exerts on household investment decisions are inversely related to the proportion of state affiliated displacement. Given that the state is conferring property rights in this program it seems intuitive that areas which experienced greater displacement by the state may be more tentative in changes to investment behaviours which require trust in the credibility and enforcement of property rights.

The extent of mistrust may be an upper bound in this study because formerly displaced people who are most distrustful of the state will likely never have applied for a state-run policy in the first instance. As such it is notable that we are picking up effects in the interaction. Investment in both the intensive and extensive margins of labour inputs are negatively correlated with displacement perpetrated by the state or a state condoned actor. I also find evidence of reticence to invest in agricultural production – the higher the displacement by a state or state affiliated actor in a municipality, the lower the investment in animal husbandry and other livestock. Although there is no effect on the total number of pieces of agricultural machinery, the interaction reveals a positive relationship between agricultural inputs and displacement by the state is the number of new agricultural machinery items. The paramilitary perpetrated greater destruction of property than the guerrilla and, as such, there is likely to be proportionately less second-hand machinery available in these areas (Saab and Taylor, 2009).

Table 1.10: Labour and Capital Investment, Animal Husbandry, and Improvements in Quality of Life

VARIABLES	Extensive		Intensive		NewM		TotM		Bov		OtherL		QualL	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Restitution	5.257*** (1.775)	13.59*** (4.244)	4.037*** (1.432)	10.35*** (3.327)	1.378 (1.368)	-5.925 (4.574)	0.144 (0.0982)	0.712** (0.360)	4.744* (2.425)	13.27** (5.639)	3.888 (3.384)	23.28*** (7.677)	5.932*** (2.263)	4.670 (5.885)
State.Para		0.00170 (0.0906)		-0.0457 (0.0766)		0.0523 (0.0836)		-0.00221 (0.00509)		-0.0363 (0.108)		0.222 (0.162)		-0.0171 (0.134)
Restitution×State.Para		-0.205* (0.110)		-0.155* (0.0878)		0.179* (0.0970)		-0.0134 (0.00815)		-0.210* (0.124)		-0.478*** (0.150)		0.0307 (0.131)
Constant	616.1 (637.8)	726.4 (673.3)	158.8 (496.8)	267.4 (519.6)	1,001** (472.5)	874.4** (443.1)	18.62 (35.75)	20.55 (36.14)	1,009* (589.8)	1,144* (616.5)	1,383* (793.2)	1,509* (833.4)	-130.1 (477.7)	-138.8 (477.9)
Observations	8,263	8,258	8,263	8,258	8,263	8,258	2,664	2,664	8,263	8,258	8,263	8,258	8,246	8,241
R-squared	0.081	0.083	0.069	0.072	0.066	0.071	0.048	0.052	0.171	0.174	0.098	0.102	0.030	0.030
Control Mean	27.88		19.81		17.06		1.852		35.91		50.33		33.54	

Note: Columns (1) and (2) show results from Equations 1.4 and 1.5 respectively, the latter of which includes an interaction between treatment and the percentage of displacement allegedly perpetrated by the state or paramilitary in a given municipality. Dependent variables are as follows: *Extensive* is a binary of whether farm hires permanent outside labour, *Intensive* denotes the percentage of permanent hired labour of total permanent labour on farm, *NewM* is a binary taking a value of one if the farm owns agricultural machinery that is less than five years old, *TotM* indicates the number of distinct pieces of agricultural machinery, *Bov* is an extensive margin measure of bovine rearing, *OtherL* is an extensive margin measure of other livestock rearing, *QualL* is a binary measure of self-reported improvements in quality of life. All regressions include controls for year household was displaced, household size, area of land (log), binary of whether applied for agricultural credit, binary of access to agricultural practices training, quantity of coffee sown, quantity of maize sown, quantity of plantain sown, quantity of cassava sown, soil quality proxied by nutrient availability, binary of historical violence in the municipality, percentage of displaced population in the vereda, longitude and latitude at the centroid of the farm. All regressions include the inverse weight of the distance between treatment and control as an analytical weight. Standard errors are clustered at the municipality-level and shown in parentheses. *, **, ***: statistically significant at the 10%, 5% and 1% level respectively.

Table 1.11: Agricultural Yields

VARIABLES	Yuca_Y		Plat_Y		Maiz_Y		Cafe_Y	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Restitution	-0.624 (0.540)	0.490 (1.024)	-0.400 (0.427)	-0.889 (0.806)	-0.0255 (0.0711)	-0.0431 (0.207)	-0.0410 (0.0549)	-0.137 (0.163)
State_Para		0.0539*** (0.0200)		0.0126 (0.0161)		0.00693* (0.00356)		-0.00257 (0.00232)
Restitution×State_Para		-0.0275 (0.0211)		0.0120 (0.0154)		0.000443 (0.00545)		0.00237 (0.00312)
Constant	160.6 (151.5)	144.3 (144.2)	-1.128 (55.09)	-14.71 (55.63)	35.63 (30.55)	31.84 (27.14)	-20.47** (9.554)	-20.25** (9.222)
Observations	8,263	8,258	8,263	8,258	8,263	8,258	8,263	8,258
R-squared	0.703	0.703	0.255	0.259	0.418	0.420	0.326	0.327
Control Mean	8.098		2.728		0.618		0.444	

Note: Columns (1) and (2) show results from Equations 1.4 and 1.5 respectively, the latter of which includes an interaction between treatment and the percentage of displacement allegedly perpetrated by the state or paramilitary in a given municipality. Dependent variables are as follows: *Yuca_Y*, *Plat_Y*, *Maiz_Y*, *Cafe_Y* denote the yield of cassava/plantain/maize/coffee grown on the farm in tons per hectare. All regressions include controls for year household was displaced, household size, area of land (log), binary of whether applied for agricultural credit, binary of access to agricultural practices training, quantity of coffee sown, quantity of maize sown, quantity of plantain sown, quantity of cassava sown, soil quality proxied by nutrient availability, binary of historical violence in the municipality, percentage of displaced population in the vereda, longitude and latitude at the centroid of the farm. All regressions include the inverse weight of the distance between treatment and control as an analytical weight. Standard errors are clustered at the municipality-level and shown in parentheses.

As robustness checks of the main estimation model, I explore dropping the municipality-level historical violence control (Appendix Tables 1.A.1 and 1.A.2), dropping municipalities with over 50% rates of missing values for the actor of displacement (Tables 1.A.3 and 1.A.4) and substituting nutrient availability for an alternative measure of soil quality (Tables 1.A.5 and 1.A.6). Results remain invariant to all these robustness checks.

I also ran the main estimation including municipality fixed effects. This was not my preferred specification for two reasons. Firstly, my trust variable was captured at the municipality-level so fixed effects at this level would have precluded this line of investigation. Secondly, I went to great lengths to ensure my treatment and control households were as geographically proximate as possible – the median distance was 6km. As such, unobservables which vary at the municipality-level between treatment and control groups will be relatively uninformative. Results are shown in Table 1.A.7 reveal that behaviour around labour is invariant to the inclusion of these fixed effects and in fact the positive coefficients on physical capital investments attain conventional statistical significance.

Finally, Tables 1.A.8 to 1.A.17 provide results pertinent to public policy. They show results of the main estimation without controlling for credit, training in agricultural practices or levels of crop inputs, and as such provide insights into the impacts of the restitution package as a whole. Results mirror the patterns from the main analysis which suggests receipt of auxiliary inputs does not alter the behaviours households undertake upon restitution, but instead magnifies them. The land restitution package is associated with greater labour investments at both the intensive and extensive margins, greater investment in animal husbandry and other livestock, and is associated with an improved self-reported quality of life.

I include additional agricultural outcome measures to help form a more complete picture of the overall impact of the restitution package. Results indicate that, controlling for size of the land, restituted households are sowing a greater area of their land with agricultural crops and sowing a greater proportion of annual crops. The restitution package provides a monetary amount which can be spent on buying crop inputs, but does not mandate which crops should be grown. It is therefore interesting to note that restituted households are electing to grow more annual crops. This defies investment behaviours expected from traditional formalisation literature. Namely, that upon receiving formal ownership rights crop choice should switch to higher yield, longer cycle perennial crops. Perennial crops improve soil health, reduce the need for annual planting and tillage, and offer long-term food security. Instead, restituted households are investing in more short-cycle annual crops such as maize, at least in the short term. This is likely due to a combination of cash flow constraints and the unique profile of displaced individuals. Restituted households have recently returned to their land and therefore require faster cash flow in the short-run. Whereas the production cycle of maize is five months from seed to harvest, the first harvest of coffee takes up to five years. As such, recently restituted households are likely to opt for quick return crops which ensure food security such as maize, and liquid agricultural assets such as bovines.

Overall, these results indicate that although restitution is associated with greater investment in

labour and animal husbandry, a level of risk-aversion may yet remain among displaced households in the short-term, thereby leading to different investment behaviours than those postulated in the formalisation literature.

1.5.2 Heterogeneity

The proportion of female-headed households is disproportionately high among internally displaced people (Amnesty International, 2014). Operating a female-headed agricultural household in a patriarchal society poses a distinct set of challenges, which may affect investment behaviours upon land restitution. As such, I run heterogeneity analysis by gender of household head. Equation 1.6 describes the model interacting treatment with a binary of whether the household is headed by a woman.

$$\begin{aligned}
 y_{hvm} = & \alpha_0 + \beta_1 \text{Restitution}_{hvm} + \beta_2 \text{Violence}_m + \beta_3 \text{Female Head}_{hvm} \\
 & + \beta_4 (\text{Restitution}_{hvm} \times \text{Female Head}_{hvm}) \\
 & + \psi' \mathbf{X}_{hvm} + \Gamma' \mathbf{G}_v + \zeta' \mathbf{Z}_k + \gamma \text{PSM}_{hvm} + \epsilon_m
 \end{aligned} \tag{1.6}$$

Restitution is a binary variable that equals 1 if household h received land restitution; Violence equals 1 for municipality m that experienced high historic violence; Female Head equals 1 when the household head is a woman; Restitution $\times$ Female Head represents the interaction between the binaries for land restitution and female-headed household; $\mathbf{X}$ denotes household-level covariates; $\mathbf{G}$ denotes vereda-level characteristics (share of displaced households); $\mathbf{Z}$ denotes geospatial controls (longitude, latitude and soil quality); PSM is the propensity score. Standard errors are clustered at the municipality level.

Results of the interaction model presented in Table 1.12 indicate female-headed households are significantly more likely to use household labour rather than hire outside workers, which is unsurprising given the gendered aspects of forced displacement. Moreover, female-headed households are leveraging land restitution to integrate into the local economy and gain financial stability, despite not altering their labour inputs.

The interaction term is negative and significant for both intensive and extensive margins of labour inputs, indicating female-headed households are less likely to hire permanent outside labour or substitute household labour for hired labour on the farm. However, the linear combination of restitution and the interaction term is insignificant suggesting that whereas land restitution seems to alter the investment decision-making pattern of men vis-a-vis labour inputs, it is not so for female-headed households. The mechanism for this may be that female-headed households are more constrained in accessing outside labour due to factors unrelated to land ownership. For example, they may be stymied by misogyny related to working on a woman-headed farm. Alternatively, it may demand-side driven - women may be less willing to hire outside labour for perceived risk-related reasons. Indeed, much of women's displacement was violent and perpetrated by men, and female-headed households are often such because spouses were killed during the conflict. Therefore they may have additional reservations about bringing unknown men onto their farm, at least in the short run. Due to the aforementioned systemic disadvantages female-headed

households face they may also be relatively more circumspect about making large financial investments such as hiring permanent labour. These types of more binding investments take may place slower, perhaps after households build up more contingency savings.

The interaction term in column (2) highlights that female-headed households have significantly higher yield in maize production – an additional 0.204 tons per hectare than male headed restituted households. Of the four main crops grown in Colombia maize is most often farmed by women. Maize has the shortest growing cycle (three to five months) and can be grown at small scale close to the home, unlike coffee which requires sloped land, takes on average five years for the first harvest and requires intensive manual labour (Doss and Morris, 2000). Maize is considered a subsistence crop, which aligns with the interaction term of column (5) that indicates that female-headed households are significantly more likely to produce for autoconsumption than male-headed households. Cash crops are linked with higher risk-taking behaviour as compared to ensuring home consumption. As such, this is additional evidence that female-headed households may be more risk-averse in agricultural investments than male-headed ones, in the short-run.

The interaction terms also indicate that female-headed households are integrating into the local economy relatively more successfully. They are 12 percentage points more likely to be producing to sell at the local market than male headed restituted households, and 13 percentage points more likely to sell to commerce.¹² On average 32% of adults in female-headed households are men as compared to 65% in male headed households. This suggests that female-headed households may focus on agricultural household production and selling their produce because on average they have less labour to sell to the market.

To investigate how outcomes differ between formerly displaced female-headed households who received land restitution and those who did not, I also ran a model restricted to the sample of female-headed households, presented in Table 1.13. Among female-headed households who have suffered forced displacement, formally restituted households are comparatively more likely to integrate into the productive economy i.e., they are seven percentage points more likely to be a member of a local cooperative and 13 percentage points more likely to produce with the aim of selling in the local market or to local commercial entities. This suggests that income generating capacity of female-headed households is significantly curtailed by a lack of property rights and land restitution relaxes these constraints noticeably, even in the short run. As the mechanism does not seem to be labour inputs, it may be related to confidence in the reduced likelihood of expropriation these property rights bestow. Restituted female-headed household are also more likely to benefit from reciprocal work on their farm which could be evidence of a further offshoot of the protection against expropriation provided by property rights.¹³

Taken together these results suggest that female-headed households leverage land restitution to gain more stable food security and to establish more stable flows of income through selling their produce in the local economy.

¹²The fact that female-headed households exhibit evidence of leveraging land restitution to gain more financial stability suggests labour decisions are based on preferences rather than constraints.

¹³The data is not extensive enough to investigate whether this increased reciprocal collective farm work is driven by other female-headed households supporting each other, but this would be an interesting avenues for future research.

Table 1.12: Interaction with Female Head

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Yuca_Y	Maiz_Y	Extensive	Intensive	AutoC	Market	Commerce
Restitution	-0.800 (0.544)	-0.0646 (0.0784)	7.053*** (1.948)	5.378*** (1.540)	-7.142** (3.038)	0.499 (2.844)	-0.227 (2.682)
Female Head	-1.119 (0.690)	-0.195** (0.0772)	13.24*** (2.506)	11.37*** (2.102)	-7.176** (3.512)	-7.374*** (2.563)	-8.495*** (2.489)
Restitution $\times$ Female Head	0.887 (0.904)	0.204** (0.0948)	-8.811*** (3.200)	-6.383** (2.600)	8.638** (4.079)	11.65*** (3.069)	12.62*** (3.100)
Constant	162.2 (151.5)	35.76 (30.52)	592.0 (637.3)	134.5 (493.9)	1107 (885.1)	763.6 (680.4)	624.7 (629.8)
Observations	8,263	8,263	8,263	8,263	5,545	5,545	5,545
R-squared	0.703	0.419	0.084	0.074	0.073	0.141	0.151

Note: Table provides output from Equation 1.6 which models an interaction of treatment with a binary of whether the household is headed by a woman. Dependent variables are as follows: *Yuca_Y*, *Maiz_Y* denote the yield of cassava and maize grown on the farm in tons per hectare, *Extensive* is a binary of whether farm hires permanent outside labour, *Intensive* denotes the percentage of permanent hired labour of total permanent labour on farm, *AutoC* binary for whether production is aimed at autoconsumption (note the aim of production allows multiple responses), *Market* binary for whether production will be sold at local market, *Commerce* binary for whether production will be sold in local commerces. All regressions include controls for year household was displaced, household size, area of land (log), binary of whether applied for agricultural credit, binary of access to agricultural practices training, quantity of coffee sown, quantity of maize sown, quantity of plantain sown, quantity of cassava sown, soil quality proxied by nutrient availability, binary of historical violence in the municipality, percentage of displaced population in the vereda, longitude and latitude at the centroid of the farm. All regressions include the inverse weight of the distance between treatment and control as an analytical weight. Standard errors are clustered at the municipality-level and shown in parentheses. *, **, ***: statistically significant at the 10%, 5% and 1% level respectively.

Table 1.13: Female Heads only Sample

VARIABLES	(1)	(2)	(3)	(4)	(5)
	Bov	Co-op	Market	Commerce	Collwork
Restitution	8.813*** (3.312)	7.866** (3.462)	13.04*** (4.015)	13.16*** (4.058)	2.757* (1.589)
Constant	1,370 (1,054)	-198.6 (722.9)	824.2 (1,146)	1,612 (1,014)	367.3 (490.6)
Observations	1,534	1,534	924	924	1,530
R-squared	0.175	0.158	0.147	0.156	0.036
Control Mean	24.86	9.164	67.06	68.32	3.331

Note: Table provides output from Equation 1.4 restricted to female-headed household sample only such that the treatment effect denotes the average outcome for female-headed households receiving land restitution compared with female-headed households in the control group. Dependent variables are as follows: *Bov* is an extensive margin measure of bovine rearing, *Co-op* binary for whether belong to a cooperative, *Market* binary for whether production will be sold at local market, *Commerce* binary for whether production will be sold in local commerces, *CollWork* is an extensive margin measure of having reciprocal work on the farm. All regressions include controls for year household was displaced, household size, area of land (log), binary of whether applied for agricultural credit, binary of access to agricultural practices training, quantity of coffee sown, quantity of maize sown, quantity of plantain sown, quantity of cassava sown, soil quality proxied by nutrient availability, binary of historical violence in the municipality, percentage of displaced population in the vereda, longitude and latitude at the centroid of the farm. All regressions include the inverse weight of the distance between treatment and control as an analytical weight. Standard errors are clustered at the municipality-level and shown in parentheses. *, **, ***: statistically significant at the 10%, 5% and 1% level respectively.

1.6 Conclusion

In this paper, I have explored the short-term impacts of land restitution to people formerly displaced by armed conflict in the context of Colombia's national post-conflict policy. Using a novel dataset, I found evidence that land restitution facilitates certain agricultural investment behaviours which align with expectations from the property rights literature on land formalisation for non-displaced households. To explore trust in enforcement I interacted treatment with the density of displacement perpetrated by the state or a perceived state condoned actor. I find evidence to support the mechanism that households in areas which experienced a shock to both their trust in the state's monopoly of violence and to their trust in the state's willingness to protect their property rights are slower to invest. This is in line with mistrust in the credibility of their property rights. Heterogeneity analysis highlights that female-headed households exhibit particularly strong behaviour changes upon receiving property rights through restitution. This is potentially related to female-headed households being more vulnerable to a lack of property rights than male-headed ones, in terms of the risk of expropriation and violence. Put otherwise, it may reflect the greater marginal benefit derived from certainty and property rights for this particularly vulnerable subgroup of the population. Female-headed households exhibit greater risk-aversion in their labour investments. However, these households are more likely to leverage land restitution to lay the foundations of integrating into the local economy and producing more productively.

Together, these results suggest that land restitution empowers households to alter their investment horizons and behaviours. It may therefore hold the potential to set formerly displaced household on a new trajectory that mitigates some of the obstacles inflicted by conflict. However, the analysis indicates exposure to displacement by the state or a state-condoned actor may leave a lasting legacy of mistrust, and impede otherwise productive investment behaviour. Research has shown that populations in conflict states may trust certain levels of governance structures more than others (Raja et al., 2017). Shifting messaging of the policy away from land restitution as a national program towards emphasising its local aspect could support take-up. A second implication of this research is the need to build a literature relating to the theory and empirics of property rights focused on displaced people. Essentially the implicit assumption of trust in property rights after formalisation may be misleading given the lived experience of displacement and impacts on risk aversion, trust and cognitive biases.

Scope for extensions to this work include exploring the effects on agricultural investment behaviour during a resurgence in violence. In the period immediately after the 2014 Agricultural Census was collected, killings of local land leaders in Colombia surged from 80 between 2010 and 2014 to 1,294 in the period 2015 to 2023.¹⁴ This presents a solemn opportunity to assess the sensitivity of trends observed in this paper when insecurity is once again on the rise. Furthermore, research suggests that most people displaced by the armed conflict in Colombia migrated to urban areas (Ibáñez et al., 2022). Future research on the effects of land restitution which capture wellbeing of IDPs living in urban areas prior to restitution could inform important policy discussion. Namely,

¹⁴According to Uppsala Conflict Data Program (UCDS) best estimates

on the value of a post-conflict policy that encourages movement of population from urban back to rural areas as compared to a policy that provides more fungible financial compensation which could allow people to choose whether to remain in urban areas or return to agricultural land. Agricultural skill loss, individual preferences and macroeconomic concerns about the role of structural change on economic growth are motivating factors to extend this research.

Appendix for Chapter 1

Table 1.A.1: Main Estimation without Controlling for Historical Violence

VARIABLES	Extensive		Intensive		NewM		TotM		Bov		OtherL		QualL	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Restitution	5.510***	14.70***	4.215***	11.15***	1.447	-5.598	0.169*	0.731**	4.333*	11.39*	4.293	24.98***	5.632**	3.322
	(1.844)	(4.410)	(1.423)	(3.461)	(1.353)	(4.350)	(0.0991)	(0.359)	(2.559)	(5.990)	(3.587)	(7.988)	(2.257)	(5.962)
State_Para		0.0224		-0.0308		0.0584		-0.000838		-0.0713		0.254		-0.0424
		(0.0856)		(0.0759)		(0.0818)		(0.00494)		(0.116)		(0.177)		(0.137)
Restitution×State_Para		-0.226**		-0.170*		0.173*		-0.0131		-0.174		-0.511***		0.0566
		(0.114)		(0.0919)		(0.0933)		(0.00803)		(0.128)		(0.154)		(0.136)
Constant	691.6	798.8	212.2	319.5	1,022**	895.7**	23.57	26.79	886.2	1,021*	1,504*	1,620*	-220.0	-226.7
	(625.7)	(662.1)	(494.8)	(516.7)	(469.8)	(437.6)	(35.46)	(34.92)	(571.1)	(607.3)	(808.8)	(839.2)	(486.7)	(489.9)
Observations	8,263	8,258	8,263	8,258	8,263	8,258	2,664	2,664	8,263	8,258	8,263	8,258	8,246	8,241
R-squared	0.079	0.082	0.068	0.071	0.066	0.070	0.047	0.050	0.168	0.171	0.095	0.100	0.028	0.028
Control Mean	27.88		19.81		17.06		1.852		35.91		50.33		33.54	

Note: Robustness displaying main estimates from Equation 1.4 and Equation 1.5 excluding the control for historical violence. There are 1,104 municipalities in Colombia speak over a surface area of 1,141,748 km². Historical violence is a municipality-level variable, given that the average distance between treatment and control households in my analysis is 9km, this variable may be skewing the results. Dependent variables are as follows: *Extensive* is a binary of whether farm hires permanent outside labour, *Intensive* denotes the percentage of permanent hired labour of total permanent labour on farm, *NewM* is a binary taking a value of one if the farm owns agricultural machinery that is less than five years old, *TotM* indicates the number of distinct pieces of agricultural machinery, *Bov* is an extensive margin measure of bovine rearing, *OtherL* is an extensive margin measure of other livestock rearing, *QualL* is a binary measure of self-reported improvements in quality of life. All regressions include controls for year household was displaced, household size, area of land (log), binary of whether applied for agricultural credit, binary of access to agricultural practices training, quantity of coffee sown, quantity of maize sown, quantity of plantain sown, quantity of cassava sown, soil quality proxied by nutrient availability, percentage of displaced population in the vereda, longitude and latitude at the centroid of the farm. All regressions include the inverse weight of the distance between treatment and control as an analytical weight. Standard errors are clustered at the municipality-level and shown in parentheses. *, **, ***: statistically significant at the 10%, 5% and 1% level respectively.

Table 1.A.2: Main Estimation without Controlling for Historical Violence (cont.)

VARIABLES	Yuca_Y		Plat_Y		Maiz_Y		Cafe_Y	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Restitution	-0.557 (0.508)	0.771 (0.874)	-0.374 (0.448)	-0.772 (0.830)	-0.00774 (0.0741)	0.0352 (0.201)	-0.0272 (0.0613)	-0.0735 (0.190)
State_Para	0.0591*** (0.0220)		0.0147 (0.0157)		0.00839** (0.00388)		-0.00139 (0.00221)	
Restitution×State_Para	-0.0329* (0.0196)		0.00974 (0.0150)		-0.00106 (0.00544)		0.00115 (0.00360)	
Constant	180.6 (160.4)	162.7 (151.4)	6.734 (48.46)	-7.089 (50.25)	40.94 (31.88)	36.93 (28.21)	-16.36* (8.734)	-16.11* (8.626)
Observations	8,263	8,258	8,263	8,258	8,263	8,258	8,263	8,258
R-squared	0.702	0.703	0.253	0.257	0.415	0.417	0.312	0.312
Control Mean	8.098		2.728		0.618		0.444	

Note: Robustness displaying main estimates from Equation 1.4 and Equation 1.5 excluding the control for historical violence. There are 1,104 municipalities in Colombia speak over a surface area of 1,141,748 km². Historical violence is a municipality-level variable, given that the average distance between treatment and control households in my analysis is 9km, this variable may be skewing the results. Dependent variables are as follows: *Yuca_Y*, *Plat_Y*, *Maiz_Y*, *Cafe_Y* denote the yield of cassava/plantain/maize/coffee grown on the farm in tons per hectare. All regressions include controls for year household was displaced, household size, area of land (log), binary of whether applied for agricultural credit, binary of access to agricultural practices training, soil quality proxied by nutrient availability, percentage of displaced population in the vereda, longitude and latitude at the centroid of the farm. All regressions include the inverse weight of the distance between treatment and control as an analytical weight. Standard errors are clustered at the municipality-level and shown in parentheses. *,**,***: statistically significant at the 10%, 5% and 1% level respectively.

Table 1.A.3: Main Estimation Excluding Municipalities with High Rates of Actor of Displacement Missing

VARIABLES	Extensive		Intensive		NewM		TotM		Bov		OtherL		QualL	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Restitution	5.247***	13.29***	3.954***	9.747***	1.383	-6.667	0.147	0.774**	4.684*	13.20**	3.866	23.26***	5.961***	4.639
	(1.775)	(4.328)	(1.433)	(3.297)	(1.371)	(4.712)	(0.101)	(0.382)	(2.439)	(5.860)	(3.389)	(7.862)	(2.268)	(5.987)
State_Para		0.00838		-0.0451		0.0538		-0.00214		-0.0372		0.231		-0.0177
		(0.0910)		(0.0768)		(0.0844)		(0.00513)		(0.109)		(0.162)		(0.135)
Restitution×State_Para		-0.197*		-0.142		0.197**		-0.0146*		-0.208		-0.477***		0.0320
		(0.112)		(0.0869)		(0.0994)		(0.00853)		(0.128)		(0.154)		(0.133)
Constant	636.1	748.4	200.5	311.0	960.5**	811.2*	20.89	23.85	1,069*	1,216*	1,363*	1,498*	-160.6	-170.7
	(644.5)	(680.2)	(499.0)	(522.7)	(476.5)	(444.1)	(36.51)	(36.89)	(592.4)	(623.1)	(803.8)	(847.4)	(481.4)	(481.7)
Observations	8,208	8,203	8,208	8,203	8,208	8,203	2,635	2,635	8,208	8,203	8,208	8,203	8,191	8,186
R-squared	0.081	0.083	0.069	0.071	0.065	0.070	0.047	0.052	0.171	0.174	0.098	0.102	0.030	0.030
Control Mean	27.80		19.78		17.01		1.851		35.93		50.21		33.55	

Note: Robustness for the soil quality control displaying main estimates from Equation 1.4 and Equation 1.5 using oxygen availability instead of nutritional availability. This measure is also taken from the GAEZ and provided at the same 0.9km by 0.9km grid-level. Dependent variables are as follows: *Extensive* is a binary of whether farm hires permanent outside labour, *Intensive* denotes the percentage of permanent hired labour of total permanent labour on farm, *NewM* is a binary taking a value of one if the farm owns agricultural machinery that is less than five years old, *TotM* indicates the number of distinct pieces of agricultural machinery, *Bov* is an extensive margin measure of bovine rearing, *OtherL* is an extensive margin measure of other livestock rearing, *QualL* is a binary measure of self-reported improvements in quality of life. All regressions include controls for year household was displaced, household size, area of land (log), binary of whether applied for agricultural credit, binary of access to agricultural practices training, quantity of coffee sown, quantity of maize sown, quantity of plantain sown, quantity of cassava sown, soil quality proxied by nutrient availability, binary of historical violence in the municipality, percentage of displaced population in the vereda, longitude and latitude at the centroid of the farm. All regressions include the inverse weight of the distance between treatment and control as an analytical weight. Standard errors are clustered at the municipality-level and shown in parentheses. *, **, ***: statistically significant at the 10%, 5% and 1% level respectively.

Table 1.A.4: Main Estimation Excluding Municipalities with High Rates of Actor of Displacement Missing (cont.)

VARIABLES	AreaS		AreaT		Divers		Cafe_57		Maiz_57		Yuca_57		Yuca_59	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Restitution	1.896***	6.225***	1.173***	2.242*	0.513*	2.220***	-0.0380	-0.302	0.978**	-0.682	1.270	8.317***	-0.00434	6.400***
	(0.480)	(1.562)	(0.370)	(1.140)	(0.274)	(0.823)	(0.116)	(0.209)	(0.396)	(1.145)	(1.443)	(2.673)	(1.210)	(2.240)
State_Para		0.00765		-0.00402		0.00388		-0.00388		0.0103		0.0958		0.111*
		(0.0228)		(0.0141)		(0.0113)		(0.00537)		(0.0178)		(0.0629)		(0.0593)
Restitution×State_Para		-0.106***		-0.0261		-0.0418**		0.00648		0.0406		-0.173***		-0.157***
		(0.0353)		(0.0253)		(0.0184)		(0.00507)		(0.0322)		(0.0608)		(0.0563)
Constant	-589.6**	-534.4**	-186.5	-169.2	-178.4	-156.8	-57.14**	-58.49**	-205.1*	-234.5**	-363.5	-323.4	-16.62	5.500
	(242.1)	(236.4)	(134.6)	(127.3)	(127.5)	(120.8)	(24.99)	(24.25)	(105.7)	(108.8)	(346.4)	(325.9)	(273.5)	(255.9)
Observations	8,208	8,203	8,208	8,203	8,208	8,203	8,208	8,203	8,208	8,203	8,208	8,203	8,208	8,203
R-squared	0.134	0.138	0.058	0.059	0.100	0.104	0.109	0.110	0.050	0.053	0.096	0.097	0.088	0.090
Control Mean	5.657		1.696		3.571		0.660		1.313		8.640		8.124	

Note: Robustness for the soil quality control displaying main estimates from Equation 1.4 and Equation 1.5 using oxygen availability instead of nutritional availability. This measure is also taken from the GAEZ and provided at the same 0.9km by 0.9km grid-level. Dependent variables are as follows: *Yuca_Y*, *Plat_Y*, *Maiz_Y*, *Cafe_Y* denote the yield of cassava/plantain/maize/coffee grown on the farm in tons per hectare. All regressions include controls for year household was displaced, household size, area of land (log), binary of whether applied for agricultural credit, binary of access to agricultural practices training, quantity of coffee sown, quantity of maize sown, quantity of plantain sown, quantity of cassava sown, soil quality proxied by nutrient availability, binary of historical violence in the municipality, percentage of displaced population in the vereda, longitude and latitude at the centroid of the farm. All regressions include the inverse weight of the distance between treatment and control as an analytical weight. Standard errors are clustered at the municipality-level and shown in parentheses. *, **, ***: statistically significant at the 10%, 5% and 1% level respectively.

Table 1.A.5: Main Estimation Controlling for Oxygen Availability in Soil

VARIABLES	Extensive		Intensive		NewM		TotM		Bov		OtherL		QualL	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Restitution	5.074***	13.86***	3.948***	10.13***	1.379	-4.922	0.220**	0.676*	4.586*	14.61***	4.202	23.36***	6.205***	2.956
	(1.756)	(4.030)	(1.430)	(3.161)	(1.353)	(4.402)	(0.106)	(0.383)	(2.411)	(5.442)	(3.440)	(7.485)	(2.299)	(5.715)
State_Para		0.00747		-0.0396		0.0491		0.000315		-0.0316		0.243		0.0258
		(0.0893)		(0.0733)		(0.0800)		(0.00532)		(0.111)		(0.161)		(0.128)
Restitution×State_Para		-0.214**		-0.150*		0.153		-0.0108		-0.245**		-0.471***		0.0788
		(0.102)		(0.0820)		(0.0930)		(0.00847)		(0.123)		(0.145)		(0.129)
Constant	578.9	742.7	150.5	303.1	954.9**	791.2*	30.91	33.86	812.7	1,034*	1,320	1,475*	70.88	-15.47
	(639.6)	(677.5)	(491.7)	(516.6)	(463.0)	(436.5)	(38.18)	(38.16)	(585.1)	(608.5)	(855.1)	(877.2)	(511.6)	(498.3)
Observations	8,264	8,259	8,264	8,259	8,264	8,259	2,664	2,664	8,264	8,259	8,264	8,259	8,247	8,242
R-squared	0.084	0.087	0.075	0.078	0.070	0.074	0.040	0.042	0.179	0.183	0.106	0.111	0.033	0.033
Control Mean	27.88		19.81		17.06		1.852		35.91		50.33		33.54	

Note: Robustness for the soil quality control displaying main estimates from Equation 1.4 and Equation 1.5 using oxygen availability instead of nutritional availability. This measure is also taken from the GAEZ and provided at the same 0.9km by 0.9km grid-level. Dependent variables are as follows: *Extensive* is a binary of whether farm hires permanent outside labour, *Intensive* denotes the percentage of permanent hired labour of total permanent labour on farm, *NewM* is a binary taking a value of one if the farm owns agricultural machinery that is less than five years old, *TotM* indicates the number of distinct pieces of agricultural machinery, *Bov* is an extensive margin measure of bovine rearing, *OtherL* is an extensive margin measure of other livestock rearing, *QualL* is a binary measure of self-reported improvements in quality of life. All regressions include controls for year household was displaced, household size, area of land (log), binary of whether applied for agricultural credit, binary of access to agricultural practices training, quantity of coffee sown, quantity of maize sown, quantity of plantain sown, quantity of cassava sown, soil quality proxied by nutrient availability, binary of historical violence in the municipality, percentage of displaced population in the vereda, longitude and latitude at the centroid of the farm. All regressions include the inverse weight of the distance between treatment and control as an analytical weight. Standard errors are clustered at the municipality-level and shown in parentheses. *, **, ***: statistically significant at the 10%, 5% and 1% level respectively.

Table 1.A.6: Main Estimation Controlling for Oxygen Availability in Soil (cont.)

VARIABLES	Yuca_Y		Plat_Y		Maiz_Y		Cafe_Y	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Restitution	-0.718 (0.590)	0.570 (0.952)	-0.424 (0.445)	-0.682 (0.838)	-0.0250 (0.0698)	-0.0657 (0.201)	-0.0481 (0.0565)	-0.0994 (0.182)
State_Para		0.0610*** (0.0221)		0.00397 (0.0180)		0.00740** (0.00358)		-0.00360 (0.00244)
Restitution×State_Para		-0.0320 (0.0201)		0.00625 (0.0159)		0.000957 (0.00519)		0.00128 (0.00359)
Constant	194.5 (152.9)	166.5 (141.7)	-27.69 (61.11)	-36.10 (58.57)	42.44 (32.81)	35.63 (27.94)	-25.52** (11.94)	-23.38** (10.41)
Observations	8,264	8,259	8,264	8,259	8,264	8,259	8,264	8,259
R-squared	0.702	0.702	0.248	0.249	0.420	0.422	0.317	0.319
Control Mean	8.098		2.728		0.618		0.444	

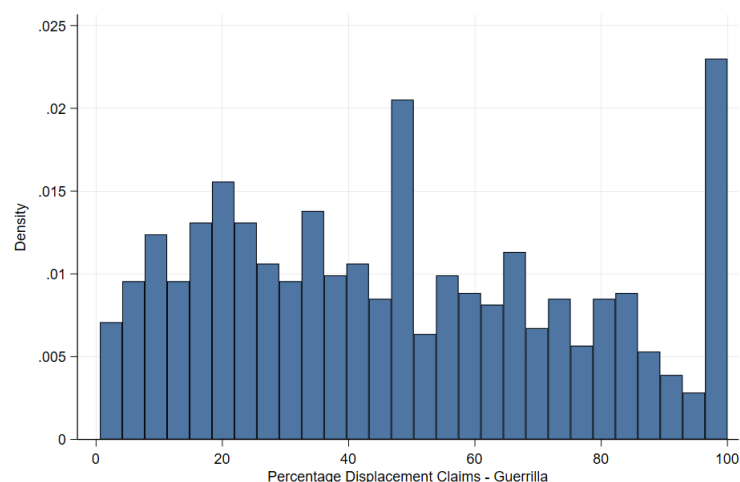
Note: Robustness for the soil quality control displaying main estimates from Equation 1.4 and Equation 1.5 using oxygen availability instead of nutritional availability. This measure is also taken from the GAEZ and provided at the same 0.9km by 0.9km grid-level. Dependent variables are as follows: *Yuca_Y*, *Plat_Y*, *Maiz_Y*, *Cafe_Y* denote the yield of cassava/plantain/maize/coffee grown on the farm in tons per hectare. All regressions include controls for year household was displaced, household size, area of land (log), binary of whether applied for agricultural credit, binary of access to agricultural practices training, quantity of coffee sown, quantity of maize sown, quantity of plantain sown, quantity of cassava sown, soil quality proxied by nutrient availability, binary of historical violence in the municipality, percentage of displaced population in the vereda, longitude and latitude at the centroid of the farm. All regressions include the inverse weight of the distance between treatment and control as an analytical weight. Standard errors are clustered at the municipality-level and shown in parentheses. *, **, ***: statistically significant at the 10%, 5% and 1% level respectively.

Table 1.A.7: Main Estimation with Municipality Fixed Effects

VARIABLES	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Cafe_Y	Maiz_Y	Plat_Y	Yuca_Y	Extensive	Intensive	NewM	TotM	Bov	OtherL	QualL
Restitution	0.0193 (0.0269)	-0.147** (0.0579)	-0.291 (0.194)	0.568 (0.484)	4.590*** (1.654)	2.880** (1.129)	4.816*** (1.126)	0.294 (0.180)	4.142 (3.875)	-0.314 (1.476)	2.616 (2.683)
Constant	-1.990 (5.559)	25.82 (17.52)	-23.49 (37.30)	154.0 (120.6)	1,277** (584.3)	680.1 (537.7)	661.3* (381.1)	-7.424 (40.99)	497.5 (433.2)	351.1 (451.9)	-277.4 (442.1)
Observations	8,263	8,263	8,263	8,263	8,263	8,263	8,263	2,664	8,263	8,263	8,246
R-squared	0.440	0.501	0.389	0.742	0.144	0.132	0.131	0.182	0.261	0.274	0.081
Control Mean	0.444	0.618	2.728	8.098	27.88	19.81	17.06	1.852	35.91	50.33	33.54

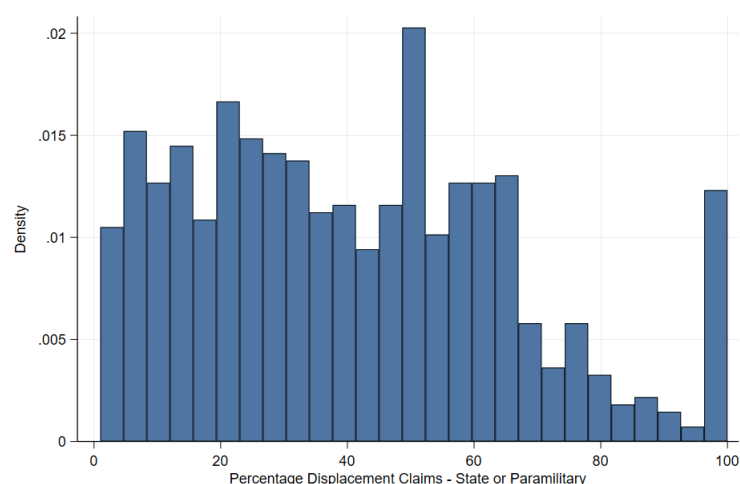
Note: Includes municipality fixed effects and no historical violence control. Dependent variables are as follows: *Yuca_Y*, *Plat_Y*, *Maiz_Y*, *Cafe_Y* denote the yield of cassava/plantain/maize/coffee grown on the farm in tons per hectare, *Extensive* is a binary of whether farm hires permanent outside labour, *Intensive* denotes the percentage of permanent hired labour of total permanent labour on farm, *NewM* is a binary taking a value of one if the farm owns agricultural machinery that is less than five years old, *TotM* indicates the number of distinct pieces of agricultural machinery, *Bov* is an extensive margin measure of bovine rearing, *OtherL* is an extensive margin measure of other livestock rearing, *QualL* is a binary measure of self-reported improvements in quality of life. All regressions include controls for year household was displaced, household size, area of land (log), binary of whether applied for agricultural credit, binary of access to agricultural practices training, quantity of coffee sown, quantity of maize sown, quantity of plantain sown, quantity of cassava sown, soil quality proxied by nutrient availability, percentage of displaced population in the vereda, longitude and latitude at the centroid of the farm. All regressions include the inverse weight of the distance between treatment and control as an analytical weight. Standard errors are clustered at the municipality-level and shown in parentheses. *, **, ***: statistically significant at the 10%, 5% and 1% level respectively.

Figure 1.A.1: Histogram – Displacement Perpetrated by Guerrilla (%), per Municipality



Note: Histogram showing the percentage of applications alleging the guerrilla perpetrated their displacement, per municipality (calculated as number of claims against the guerrilla in the municipality divided by the total number of claims in the municipality). Source: Dataset of 87,117 land restitution claims received by URT between 2011 and 2015. Figure excludes the 18.53% municipalities with no displacement claims against the guerrilla, for ease of visualisation.

Figure 1.A.2: Histogram – Displacement Perpetrated by Paramilitary or State (%), per Municipality



Note: Histogram showing the percentage of applications claiming the state or paramilitary perpetrated their displacement, per municipality (calculated as number of claims against the state or paramilitary in the municipality divided by the total number of claims in the municipality). Source: Dataset of 87,117 land restitution claims received by URT between 2011 and 2015. Figure excludes the 22.93% municipalities with no displacement claims against the state or paramilitary for ease of visualisation.

Table 1.A.8: Labour and Capital Investment, Animal Husbandry, and Improvements in Quality of Life – Restitution ‘Package’ Public Policy

VARIABLES	Extensive		Intensive		NewM		TotM		Bov		OtherL		QualL	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Restitution	5.007***	11.87***	3.714***	9.218***	0.963	-8.698*	0.154	0.706*	6.059**	16.64***	5.551	28.19***	5.710**	2.714
	(1.717)	(4.241)	(1.395)	(3.370)	(1.474)	(5.059)	(0.0959)	(0.365)	(2.599)	(6.141)	(3.872)	(8.442)	(2.356)	(6.030)
State_Para		-0.0132		-0.0582		0.0265		-0.00268		-0.00545		0.281		-0.0327
		(0.0921)		(0.0763)		(0.0926)		(0.00472)		(0.118)		(0.176)		(0.133)
Restitution×State_Para		-0.169		-0.136		0.238**		-0.0130		-0.261**		-0.560***		0.0736
		(0.111)		(0.0884)		(0.106)		(0.00825)		(0.133)		(0.165)		(0.133)
Constant	534.5	626.4	131.3	229.0	916.7*	785.6*	25.51	27.33	1,282*	1,415**	1,558*	1,676*	-190.6	-211.0
	(633.4)	(662.0)	(498.8)	(519.1)	(481.5)	(441.3)	(35.69)	(36.05)	(658.1)	(683.6)	(905.7)	(935.6)	(488.4)	(491.0)
Observations	8,263	8,258	8,263	8,258	8,263	8,258	2,664	2,664	8,263	8,258	8,263	8,258	8,246	8,241
R-squared	0.080	0.082	0.072	0.075	0.045	0.051	0.044	0.049	0.152	0.155	0.082	0.089	0.031	0.031
Control Mean	27.88		19.81		17.06		1.852		35.91		50.33		33.54	

Note: Columns (1) and (2) show results from Equations 1.4 and 1.5 respectively, the latter of which includes an interaction between treatment and the percentage of displacement allegedly perpetrated by the state or paramilitary in a given municipality. Dependent variables are as follows: *Extensive* is a binary of whether farm hires permanent outside labour, *Intensive* denotes the percentage of permanent hired labour of total permanent labour on farm, *NewM* is a binary taking a value of one if the farm owns agricultural machinery that is less than five years old, *TotM* indicates the number of distinct pieces of agricultural machinery, *Bov* is an extensive margin measure of bovine rearing, *OtherL* is an extensive margin measure of other livestock rearing, *QualL* is a binary measure of self-reported improvements in quality of life. All regressions include controls for year household was displaced, household size, area of land (log), soil quality proxied by nutrient availability, binary of historical violence in the municipality, percentage of displaced population in the vereda, longitude and latitude at the centroid of the farm. All regressions include the inverse weight of the distance between treatment and control as an analytical weight. Standard errors are clustered at the municipality-level and shown in parentheses. *, **, ***: statistically significant at the 10%, 5% and 1% level respectively.

Table 1.A.9: Agricultural Investments – Restitution ‘Package’ Public Policy

VARIABLES	AreaS		AreaT		Yuca_Y		Plat_Y		Maiz_Y		Cafe_Y	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Restitution	1.737*** (0.473)	5.125*** (1.410)	1.135*** (0.363)	2.027** (1.025)	0.150 (1.199)	6.810*** (2.140)	-0.604 (0.529)	-1.753* (0.961)	0.101 (0.108)	-0.110 (0.328)	-0.0922 (0.0798)	-0.390* (0.204)
State_Para		0.00152 (0.0210)		-0.00450 (0.0135)		0.113* (0.0598)		0.00864 (0.0185)		0.00863* (0.00508)		-0.00505 (0.00359)
Restitution×State_Para		-0.0837** (0.0324)		-0.0220 (0.0232)		-0.165*** (0.0548)		0.0283 (0.0180)		0.00523 (0.00892)		0.00736* (0.00393)
Constant	-620.8*** (238.0)	-581.8** (233.1)	-194.0 (136.4)	-181.0 (130.3)	0.724 (276.5)	18.70 (260.1)	-33.21 (60.64)	-51.76 (61.05)	10.26 (39.01)	3.437 (35.32)	-36.88*** (12.94)	-37.71*** (12.67)
Observations	8,263	8,258	8,263	8,258	8,263	8,258	8,263	8,258	8,263	8,258	8,263	8,258
R-squared	0.131	0.134	0.057	0.058	0.087	0.089	0.057	0.065	0.053	0.059	0.061	0.065
Control Mean	5.645		1.692		8.098		2.728		0.618		0.444	

Note: Columns (1) and (2) show results from Equations 1.4 and 1.5 respectively, the latter of which includes an interaction between treatment and the percentage of displacement allegedly perpetrated by the state or paramilitary in a given municipality. Dependent variables are as follows: *AreaS* denotes the area of land sown in hectares, *AreaT* denotes the percentage of annual crops grown on the farm, *Yuca_Y*, *Plat_Y*, *Maize_Y*, *Cafe_Y* denote the yield of cassava, plantain, maize, coffee grown on the farm in tons per hectare. All regressions include controls for year household was displaced, household size, area of land (log), soil quality proxied by nutrient availability, binary of historical violence in the municipality, percentage of displaced population in the vereda, longitude and latitude at the centroid of the farm. All regressions include the inverse weight of the distance between treatment and control as an analytical weight. Standard errors are clustered at the municipality-level and shown in parentheses. *, **, ***: statistically significant at the 10%, 5% and 1% level respectively.

Table 1.A.10: Interaction with Female Head – Restitution ‘Package’ Public Policy

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	AreaS	AreaT	Yuca_Y	Plat_Y	Maiz_Y	Cafe_Y	Extensive	Intensive	AutoC	Market	Commerce
Restitution	1.755*** (0.513)	1.107*** (0.383)	-0.608 (1.391)	-0.668 (0.538)	0.0589 (0.113)	-0.0975 (0.0804)	6.875*** (1.922)	5.190*** (1.523)	-7.296** (3.043)	0.314 (3.114)	-0.668 (2.908)
Female Head	-0.328 (0.439)	-0.218 (0.186)	-4.175** (1.695)	-0.367 (0.235)	-0.206** (0.0825)	-0.0534 (0.0517)	13.02*** (2.579)	11.38*** (2.122)	-8.729** (3.588)	-8.052*** (2.745)	-9.334*** (2.651)
Restitution×Female Head	-0.149 (0.531)	0.135 (0.281)	3.902** (1.842)	0.329 (0.311)	0.219* (0.113)	0.0240 (0.0558)	-8.730*** (3.265)	-6.372** (2.627)	9.806** (4.079)	12.23*** (3.341)	13.30*** (3.302)
Constant	-619.1*** (237.8)	-193.6 (136.4)	5.012 (276.4)	-32.79 (60.69)	10.39 (38.99)	-36.75*** (12.94)	479.1 (633.5)	72.41 (493.1)	1,249 (907.6)	510.6 (704.2)	365.6 (663.4)
Observations	8,263	8,263	8,263	8,263	8,263	8,263	8,263	8,263	5,545	5,545	5,545
R-squared	0.131	0.057	0.088	0.057	0.053	0.062	0.081	0.073	0.051	0.107	0.113

Note: Table provides output from Equation 1.6 which models an interaction of treatment with a binary of whether the household is headed by a woman. Dependent variables are as follows: *AreaS* denotes the area of land sown (hectares), *AreaT* denotes the percentage of annual crops grown on the farm, *Yuca_Y*, *Plat_Y*, *Maize_Y*, *Cafe_Y* denote the yield of cassava, plantain, maize, coffee grown on the farm in tons per hectare, *Extensive* is a binary of whether farm hires permanent outside labour, *Intensive* denotes the percentage of permanent hired labour of total permanent labour on farm, *AutoC* binary for whether production is aimed at autoconsumption, *Market* binary for whether production will be sold at local market, *Commerce* binary for whether production will be sold in local commerces. Note the aim of production allows multiple responses. All regressions include controls for year household was displaced, household size, area of land (log), soil quality proxied by nutrient availability, binary of historical violence in the municipality, percentage of displaced population in the vereda, longitude and latitude at the centroid of the farm. All regressions include the inverse weight of the distance between treatment and control as an analytical weight. Standard errors are clustered at the municipality-level and shown in parentheses. *, **, ***: statistically significant at the 10%, 5% and 1% level respectively.

Table 1.A.11: Female Heads only Sample – Restitution ‘Package’ Public Policy

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	AreaS	AreaT	Yuca_Y	Plat_Y	Maiz_Y	Cafe_Y	Bov	Co-op	Market	Commerce	Collwork	QualL
Restitution	1.229** (0.536)	1.042*** (0.307)	3.090** (1.416)	-0.0745 (0.544)	0.257* (0.135)	-0.0570 (0.0900)	10.09*** (3.454)	6.492** (3.217)	13.85*** (4.371)	13.74*** (4.407)	3.213** (1.527)	5.751* (3.245)
Constant	-75.93 (145.0)	-45.34 (78.04)	-490.2 (296.9)	-135.6 (98.11)	10.20 (50.78)	-47.28*** (17.04)	1,572 (1,090)	-337.8 (807.7)	539.1 (1,182)	1,328 (1,041)	374.8 (497.4)	-1,292 (989.9)
Observations	1,534	1,534	1,534	1,534	1,534	1,534	1,534	1,534	924	924	1,530	1,533
R-squared	0.203	0.111	0.052	0.097	0.052	0.062	0.146	0.057	0.099	0.106	0.013	0.042
Control Mean	3.666	0.814	2.434	2.278	0.366	0.419	24.86	9.164	67.06	68.32	3.331	30.84

Note: Table provides output from Equation 1.4 restricted to female-headed household sample only such that the treatment effect denotes the average outcome for female-headed households receiving land restitution compared with female-headed households in the control group. Dependent variables are as follows: *AreaS* denotes the area of land sown (hectares), *AreaT* denotes the percentage of annual crops grown on the farm, *Yuca_Y*, *Plat_Y*, *Maize_Y*, *Cafe_Y* denote the yield of cassava, plantain, maize, coffee grown on the farm in tons per hectare, *Bov* is an extensive margin measure of bovine rearing, *Co-op* binary for whether belong to a cooperative, *Market* binary for whether production will be sold at local market, *Commerce* binary for whether production will be sold in local commerces, *CollWork* is an extensive margin measure of having reciprocal work on the farm, *QualL* is a binary measure of self-reported improvements in quality of life. All regressions include controls for year household was displaced, household size, area of land (log), soil quality proxied by nutrient availability, binary of historical violence in the municipality, percentage of displaced population in the vereda, longitude and latitude at the centroid of the farm. All regressions include the inverse weight of the distance between treatment and control as an analytical weight. Standard errors are clustered at the municipality-level and shown in parentheses. *, **, ***: statistically significant at the 10%, 5% and 1% level respectively.

Table 1.A.12: Main Estimation Controlling for Oxygen Availability in Soil – Restitution ‘Package’ Public Policy

VARIABLES	Extensive		Intensive		NewM		TotM		Bov		OtherL		QualL	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Restitution	1.644*** (0.461)	5.207*** (1.377)	1.092*** (0.381)	2.083** (1.022)	0.0558 (1.305)	6.730*** (2.033)	-0.639 (0.558)	-1.505 (1.017)	0.0975 (0.105)	-0.111 (0.320)	-0.0979 (0.0840)	-0.346 (0.224)		
State_Para		0.00724 (0.0201)		0.00177 (0.0127)		0.151** (0.0743)		-0.00285 (0.0219)		0.0102* (0.00544)		-0.00684* (0.00384)		
Restitution×State_Para		-0.0874*** (0.0312)		-0.0243 (0.0229)		-0.165*** (0.0575)		0.0212 (0.0191)		0.00506 (0.00851)		0.00612 (0.00436)		
Constant	-605.4** (241.3)	-547.9** (234.2)	-171.7 (135.4)	-155.3 (128.2)	151.7 (315.7)	144.9 (282.9)	-66.43 (69.15)	-79.80 (65.40)	23.61 (43.87)	11.68 (37.64)	-43.90*** (15.52)	-42.62*** (14.23)		
Observations	8,264	8,259	8,264	8,259	8,264	8,259	8,264	8,259	8,264	8,259	8,264	8,259		
R-squared	0.133	0.136	0.060	0.060	0.082	0.084	0.046	0.049	0.055	0.063	0.048	0.052		
Control Mean	5.645		1.692		8.098		2.728		0.618		0.444			

Note: Robustness for the soil quality control displaying main estimates from Equation 1.4 and Equation 1.5 using oxygen availability instead of nutritional availability. This measure is also taken from the GAEZ and provided at the same 0.9km by 0.9km grid-level. Dependent variables are as follows: *AreaT* denotes the percentage of annual crops grown on the farm, *Yuca_Y*, *Plat_Y*, *Maize_Y*, *Cafe_Y* denote the yield of cassava, plantain, maize, coffee grown on the farm in tons per hectare. All regressions include controls for year household was displaced, household size, area of land (log), soil quality proxied by nutrient availability, binary of historical violence in the municipality, percentage of displaced population in the vereda, longitude and latitude at the centroid of the farm. All regressions include the inverse weight of the distance between treatment and control as an analytical weight. Standard errors are clustered at the municipality-level and shown in parentheses. *, **, ***: statistically significant at the 10%, 5% and 1% level respectively.

Table 1.A.13: Main Estimation Controlling for Oxygen Availability in Soil (cont.) – Restitution ‘Package’ Public Policy

VARIABLES	Extensive		Intensive		NewM		TotM		Bov		OtherL		QualL	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Restitution	4.906***	10.22**	3.739***	7.788**	0.927	-8.129	0.229**	0.695*	5.794**	16.92***	5.548	27.19***	5.899**	1.821
	(1.722)	(4.792)	(1.410)	(3.612)	(1.463)	(5.043)	(0.107)	(0.399)	(2.648)	(5.934)	(3.892)	(8.019)	(2.390)	(5.912)
State_Para		-0.0811		-0.0985		0.00289		0.000319		-0.0214		0.284		0.0238
		(0.104)		(0.0812)		(0.0900)		(0.00457)		(0.128)		(0.180)		(0.129)
Restitution×State_Para		-0.145		-0.109		0.220**		-0.0110		-0.278**		-0.538***		0.102
		(0.111)		(0.0878)		(0.105)		(0.00871)		(0.134)		(0.155)		(0.131)
Constant	447.9	285.8	71.43	7.650	849.8*	650.6	38.00	41.17	1,087	1,200*	1,567	1,616	55.54	19.91
	(639.1)	(686.7)	(490.9)	(503.8)	(480.1)	(431.3)	(38.08)	(37.92)	(667.3)	(661.0)	(993.1)	(1,001)	(529.9)	(500.2)
Observations	8,264	8,259	8,264	8,259	8,264	8,259	2,664	2,664	8,264	8,259	8,264	8,259	8,247	8,242
R-squared	0.081	0.066	0.073	0.064	0.047	0.052	0.033	0.036	0.159	0.162	0.083	0.087	0.029	0.029
Control Mean	27.88		19.81		17.06		1.852		35.91		50.33		33.54	

Note: Robustness for the soil quality control displaying main estimates from Equation 1.4 and Equation 1.5 using oxygen availability instead of nutritional availability. This measure is also taken from the GAEZ and provided at the same 0.9km by 0.9km grid-level. Dependent variables are as follows: *Extensive* is a binary of whether farm hires permanent outside labour, *Intensive* denotes the percentage of permanent hired labour of total permanent labour on farm, *NewM* is a binary taking a value of one if the farm owns agricultural machinery that is less than five years old, *TotM* indicates the number of distinct pieces of agricultural machinery, *Bov* is an extensive margin measure of bovine rearing, *OtherL* is an extensive margin measure of other livestock rearing, *QualL* is a binary measure of self-reported improvements in quality of life. All regressions include controls for year household was displaced, household size, area of land (log), soil quality proxied by nutrient availability, binary of historical violence in the municipality, percentage of displaced population in the vereda, longitude and latitude at the centroid of the farm. All regressions include the inverse weight of the distance between treatment and control as an analytical weight. Standard errors are clustered at the municipality-level and shown in parentheses. *, **, ***: statistically significant at the 10%, 5% and 1% level respectively.

Table 1.A.14: Main Estimation without Controlling for Historical Violence (cont.) – Restitution ‘Package’ Public Policy

VARIABLES	Extensive		Intensive		NewM		TotM		Bov		OtherL		QualL	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Restitution	5.256***	12.99***	3.886***	10.00***	1.024	-8.388*	0.175*	0.723**	5.622**	14.60**	5.947	29.82***	5.439**	1.500
	(1.783)	(4.364)	(1.384)	(3.486)	(1.458)	(4.851)	(0.0974)	(0.365)	(2.747)	(6.588)	(4.064)	(8.666)	(2.350)	(6.108)
State_Para		0.00777		-0.0435		0.0323		-0.00147		-0.0437		0.312		-0.0557
		(0.0862)		(0.0753)		(0.0910)		(0.00484)		(0.127)		(0.193)		(0.136)
Restitution×State_Para		-0.191*		-0.151		0.232**		-0.0128		-0.222		-0.591***		0.0971
		(0.114)		(0.0921)		(0.102)		(0.00814)		(0.138)		(0.166)		(0.137)
Constant	610.7	699.5	184.0	280.4	935.4**	806.0*	29.50	32.64	1,148*	1,282*	1,679*	1,783*	-273.6	-290.8
	(620.1)	(649.9)	(496.6)	(516.3)	(473.4)	(431.0)	(35.73)	(35.19)	(643.4)	(678.7)	(929.0)	(949.3)	(498.0)	(502.3)
Observations	8,263	8,258	8,263	8,258	8,263	8,258	2,664	2,664	8,263	8,258	8,263	8,258	8,246	8,241
R-squared	0.079	0.081	0.071	0.074	0.045	0.050	0.044	0.047	0.148	0.151	0.079	0.086	0.029	0.030
Control Mean	27.88		19.81		17.06		1.852		35.91		50.33		33.54	

Note: Robustness displaying main estimates from Equation 1.4 and Equation 1.5 excluding the control for historical violence. There are 1,104 municipalities in Colombia speak over a surface area of 1,141,748 km². Historical violence is a municipality-level variable, given that the average distance between treatment and control households in my analysis is 9km, this variable may be skewing the results. Dependent variables are as follows: *Extensive* is a binary of whether farm hires permanent outside labour, *Intensive* denotes the percentage of permanent hired labour of total permanent labour on farm, *NewM* is a binary taking a value of one if the farm owns agricultural machinery that is less than five years old, *TotM* indicates the number of distinct pieces of agricultural machinery, *Bov* is an extensive margin measure of bovine rearing, *OtherL* is an extensive margin measure of other livestock rearing, *QualL* is a binary measure of self-reported improvements in quality of life. All regressions include controls for year household was displaced, household size, area of land (log), soil quality proxied by nutrient availability, percentage of displaced population in the vereda, longitude and latitude at the centroid of the farm. All regressions include the inverse weight of the distance between treatment and control as an analytical weight. Standard errors are clustered at the municipality-level and shown in parentheses. *, **, ***: statistically significant at the 10%, 5% and 1% level respectively.

Table 1.A.15: Main Estimation with Municipality Fixed Effects – Restitution ‘Package’ Public Policy

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	AreaS	AreaT	Yuca_Y	Plat_Y	Maiz_Y	Cafe_Y	Extensive	Intensive	NewM	TotM	Bov	OtherL	QualL
Restitution	0.124 (0.481)	0.267 (0.419)	1.568* (0.860)	-0.558** (0.220)	-0.111* (0.0587)	-0.00500 (0.0358)	4.287** (1.656)	2.684** (1.104)	4.520*** (1.098)	0.311* (0.179)	4.546 (3.917)	-0.548 (1.476)	2.320 (2.684)
Constant	-619.4** (283.7)	-69.35 (124.0)	51.93 (94.33)	-46.10 (38.41)	0.430 (20.14)	-8.010 (6.687)	1,194** (579.8)	643.2 (534.1)	622.0* (371.0)	-3.208 (41.41)	518.5 (423.5)	313.9 (459.2)	-310.5 (449.6)
Observations	8,263	8,263	8,263	8,263	8,263	8,263	8,263	8,263	8,263	2,664	8,263	8,263	8,246
R-squared	0.213	0.140	0.222	0.257	0.245	0.286	0.140	0.130	0.118	0.178	0.251	0.267	0.079
Control Mean	5.645	1.692	8.098	2.728	0.618	0.444	27.88	19.81	17.06	1.852	35.91	50.33	33.54

Note: Includes municipality fixed effects and no historical violence control. Dependent variables are as follows: *AreaS* denotes the area of land sown (hectares), *AreaT* denotes the percentage of annual crops grown on the farm, *Yuca_Y*, *Plat_Y*, *Maize_Y*, *Cafe_Y* denote the yield of cassava, plantain, maize, coffee grown on the farm in tons per hectare, *Extensive* is a binary of whether farm hires permanent outside labour, *Intensive* denotes the percentage of permanent hired labour of total permanent labour on farm, *NewM* is a binary taking a value of one if the farm owns agricultural machinery that is less than five years old, *TotM* indicates the number of distinct pieces of agricultural machinery, *Bov* is an extensive margin measure of bovine rearing, *OtherL* is an extensive margin measure of other livestock rearing, *QualL* is a binary measure of self-reported improvements in quality of life. All regressions include controls for year household was displaced, household size, area of land (log), soil quality proxied by nutrient availability, percentage of displaced population in the vereda, longitude and latitude at the centroid of the farm. All regressions include the inverse weight of the distance between treatment and control as an analytical weight. Standard errors are clustered at the municipality-level and shown in parentheses. *, **, ***: statistically significant at the 10%, 5% and 1% level respectively.

Table 1.A.16: Main Estimation Excluding Municipalities with High Rates of Actor of Displacement Missing – Restitution ‘Package’ Public Policy

VARIABLES	AreaS		AreaT		Yuca_Y		Plat_Y		Maiz_Y		Cafe_Y	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Restitution	1.759*** (0.479)	5.495*** (1.476)	1.141*** (0.366)	2.133** (1.079)	0.0835 (1.206)	6.534*** (2.246)	-0.604 (0.529)	-1.790* (0.974)	0.103 (0.109)	-0.0949 (0.330)	-0.0901 (0.0797)	-0.378* (0.207)
Paramilitary		0.000761 (0.0214)		-0.00490 (0.0137)		0.112* (0.0596)		0.00892 (0.0187)		0.00848* (0.00510)		-0.00507 (0.00362)
Restitution×Paramilitary		-0.0919*** (0.0335)		-0.0244 (0.0242)		-0.159*** (0.0565)		0.0291 (0.0183)		0.00488 (0.00891)		0.00709* (0.00399)
Constant	-610.8** (239.8)	-562.2** (234.1)	-192.0 (137.4)	-176.0 (130.5)	-1.218 (279.9)	18.37 (262.6)	-31.71 (61.94)	-52.95 (62.47)	11.75 (39.71)	4.471 (35.81)	-36.32*** (13.17)	-37.16*** (12.91)
Observations	8,208	8,203	8,208	8,203	8,208	8,203	8,208	8,203	8,208	8,203	8,208	8,203
R-squared	0.131	0.135	0.057	0.058	0.087	0.089	0.057	0.066	0.053	0.058	0.061	0.065
Control Mean	5.657		1.696		8.124		2.729		0.620		0.444	

Note: Robustness displaying main estimates from Equation 1.4 and Equation 1.5 excluding the nine municipalities in which less than 50% of land restitution claims named an actor of displacement. Dependent variables are as follows: *AreaS* denotes the area of land sown (hectares), *AreaT* denotes the percentage of annual crops grown on the farm, *Yuca_Y*, *Plat_Y*, *Maize_Y*, *Cafe_Y* denote the yield of cassava, plantain, maize, coffee grown on the farm in tons per hectare. All regressions include controls for year household was displaced, household size, area of land (log), soil quality proxied by nutrient availability, binary of historical violence in the municipality, percentage of displaced population in the vereda, longitude and latitude at the centroid of the farm. All regressions include the inverse weight of the distance between treatment and control as an analytical weight. Standard errors are clustered at the municipality-level and shown in parentheses. *, **, ***: statistically significant at the 10%, 5% and 1% level respectively.

Table 1.A.17: Main Estimation Excluding Municipalities with High Rates of Actor of Displacement Missing (cont.) – Restitution ‘Package’ Public Policy

VARIABLES	Extensive		Intensive		NewM		TotM		Bov		OtherL		QualL	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Restitution	4.996***	11.59***	3.621**	8.570**	0.968	-9.421*	0.157	0.774**	5.992**	16.54***	5.495	28.01***	5.759**	2.800
	(1.720)	(4.348)	(1.396)	(3.352)	(1.478)	(5.226)	(0.0984)	(0.388)	(2.608)	(6.327)	(3.872)	(8.626)	(2.364)	(6.132)
State_Para		-0.00669		-0.0581		0.0277		-0.00259		-0.00606		0.291		-0.0322
		(0.0926)		(0.0766)		(0.0938)		(0.00478)		(0.119)		(0.177)		(0.134)
Restitution×State_Para		-0.162		-0.121		0.255**		-0.0144*		-0.259*		-0.555***		0.0724
		(0.113)		(0.0877)		(0.109)		(0.00866)		(0.136)		(0.168)		(0.135)
Constant	552.2	646.9	170.2	271.1	876.2*	719.8	27.83	30.87	1,330**	1,479**	1,531*	1,660*	-215.1	-237.9
	(640.2)	(669.0)	(500.9)	(522.2)	(485.7)	(442.1)	(36.61)	(36.94)	(661.6)	(691.6)	(915.5)	(949.0)	(491.9)	(494.9)
Observations	8,208	8,203	8,208	8,203	8,208	8,203	2,635	2,635	8,208	8,203	8,208	8,203	8,191	8,186
R-squared	0.080	0.082	0.072	0.074	0.043	0.049	0.044	0.049	0.151	0.154	0.083	0.089	0.031	0.031
Control Mean	27.80		19.78		17.01		1.851		35.93		50.21		33.55	

Note: Robustness displaying main estimates from Equation 1.4 and Equation 1.5 excluding the nine municipalities in which less than 50% of land restitution claims named an actor of displacement. Dependent variables are as follows: *Extensive* is a binary of whether farm hires permanent outside labour, *Intensive* denotes the percentage of permanent hired labour of total permanent labour on farm, *NewM* is a binary taking a value of one if the farm owns agricultural machinery that is less than five years old, *TotM* indicates the number of distinct pieces of agricultural machinery, *Bov* is an extensive margin measure of bovine rearing, *OtherL* is an extensive margin measure of other livestock rearing, *QualL* is a binary measure of self-reported improvements in quality of life. All regressions include controls for year household was displaced, household size, area of land (log), soil quality proxied by nutrient availability, binary of historical violence in the municipality, percentage of displaced population in the vereda, longitude and latitude at the centroid of the farm. All regressions include the inverse weight of the distance between treatment and control as an analytical weight. Standard errors are clustered at the municipality-level and shown in parentheses. *, **, ***: statistically significant at the 10%, 5% and 1% level respectively.

Chapter 2

Formalising Land Ownership of Formerly Displaced Women – Effects on Resource Allocation in a Post-Conflict Setting

2.1 Introduction

Conflict induced displacement is increasing around the world and research shows that forced displacement imposes a psychological and financial toll on adults, children, and society (Becker and Ferrara, 2019b; Ruiz and Vargas-Silva, 2015b; Bauer et al., 2014; Ibáñez and Moya, 2010). Women are disproportionately displaced during conflicts, and predominantly live in patriarchal systems which compound the hurdles they face when trying to rebuild post-conflict.¹ Governments across the world are seeking policies which revive prosperity and integration in the wake of armed conflict. Including women and their lived experience in post-conflict institution building has been recognised as essential to laying the foundations of a sustainable peace (UN Security Council, 2000, Resolution 1325). Given that land is often a central contention in armed conflicts, rural agricultural reform is perceived as an important lever to peace. However, land ownership is unequal across households in Colombia and in particular between men and women.² UN women and Colombia's national statistics agency (DANE) find that only 36.3% of individually owned rural properties are registered to women (Arango and Ramírez, 2021). Women's land tenure is strongly correlated with women's intrahousehold bargaining power, increases in which have been shown to reduce poverty and improve well-being (Meinzen-Dick et al., 2019). However,

¹Deere and Leon (2003) posit that gendered inequality in land ownership stems from male preference in inheritance, male privilege in marriage, alongside male bias in the community and in state programs of land distribution. Deere and León (2001) find that even when both genders inherit land, sons inherit not only more land, but land of better quality. J. Luis Rocha (2019) finds evidence that gender bias permeates the state in Nicaragua's agrarian reform where female-headed farms are given smaller parcels on average. This is interpreted as a result of 'unconscious discrimination' regarding the gender division of labour reflecting the view that women do not need more than enough for household food security.

²The land Gini stands at 0.89 (World Bank, 2021).

agricultural reforms have seldom been gender-aware, and to my knowledge none have been assessed empirically in a post-conflict setting.

I explore whether formalising ownership rights of women who have been internally displaced through armed conflict can help break the intergenerational cycle of poverty triggered by displacement.³ Specifically, this paper explores the extent to which formalising women's land ownership in a post-conflict setting affects household resource allocations towards human capital accumulation and women's labour supply. Further, I take advantage of the unique nature of Colombia's land restitution law which mandates that both men and women be formally titled on the property deed to assess the mediating effect of a woman's intrahousehold bargaining power on household resource allocation decisions.

To examine these research questions causally, I created a novel dataset which identifies married women who were internally displaced by Colombia's armed conflict and who received land restitution and formalisation between 2012 and 2018 through the 'Victim's Law' (Colombia, 2011). I then exploit the geospatial aspect of the staggered policy implementation to identify a control group of married women who were also displaced during the armed conflict but lived within a 5 km radius outside the borders of the eligibility area, and who as such were not yet able to apply for land restitution. This dataset was constructed by triangulating administrative datasets, census data and geospatial data, and enables an assessment of mid-term impacts.

Suggestive evidence appears only among households in which the woman had the lowest intra-household bargaining power prior to restitution. In these households the school attendance of girls above mandatory education age trends upwards, and adult women in these households substitute their labour supply towards income-generating work. No such trends emerge among households in which mothers had the highest bargaining power, suggesting women in these households may have been able to assert their resource allocation preferences for human capital investments prior to restitution. Although I find no conclusive evidence, the more pronounced findings among more vulnerable women highlight the importance of a policy which mandates joint titling rather than leaving it to the discretion of the husband.

This paper builds on literature progressing economic theory of the household beyond Becker (1981)'s unitary view to models which more accurately represent the power dynamics at play. Collective bargaining models allow for individual members of the household to hold differing preferences over resource allocation (Doss, 2013). The degree to which the allocation reflects a given person's preferences is the outcome of a Nash Equilibrium bargaining process based on each person's outside option – the income a person could generate if the household dissolved. Land ownership, particularly in predominantly agrarian societies, has been theoretically shown to increase women's outside option (Walther, 2018; Widman and Hart, 2019), and empirically shown

³Colombia experienced a 50 year armed conflict which led to 7.7 million people being internally displaced and approximately 8 million hectares of land forcibly taken (Amnesty International, 2015). The total number of deaths in the conflict stands at 220,000 (G. Sánchez, et al., 2021). In the wake of the conflict Colombia enacted a comprehensive post-conflict public policy which included the Victim's Law which decreed that individuals displaced during the conflict between 1991 and 2011 could receive land restitution and formalisation of their land rights. Importantly the policy mandated that both (heterosexual) spouses should be named on the property deed. As such women who received land restitution, regardless of their prior intrahousehold bargaining power, experienced a shock to their standing within the couple.

to move household resource allocations closer to her preferences in the realms of human capital investment (Galiani and Schargrodsky, 2010; Ngenzebuke et al., 2016; Deininger et al., 2010), healthcare (Muchomba, 2017), time allocation (Schling et al., 2023; Heath and Jayachandran, 2016), agricultural input decisions (Ali et al., 2014; Wiig, 2013; Bezu and Holden, 2014), and intimate partner violence (Oduro et al., 2015).⁴

However, the literature on women's formalisation is cautionary. Evidence has shown that formalisation policies which only name the husband – either because joint ownership is voluntary or because the policy solely names the household head – can reduce a woman's intrahousehold bargaining power and leave her more vulnerable (Dokken, 2015; Deere, 2017).⁵ Sometimes even policies which are gender-sensitive – such as mandated joint titling – have a pernicious way of not reaching female beneficiaries.⁶ In order for mandatory joint formalisation programs to translate into improvements in women's outside options either societal norms must update, such that communities build into their expectations the belief that women own an equal share of the property – and will be owed equal rights in the event of divorce – or an effective enforcement system must be in place. Without one of these mechanisms, *de jure* women's tenancy rights may not translate into *de facto* rights (Lavers, 2015; Jacobs and Kes, 2015).⁷ Well-intentioned policies fall short when they fail to take into account fundamental precepts raised in the seminal work of Agarwal (1997) – policy must address the context, institutions, and culture in which women exist in order to ensure they have the capability to take advantage of the opportunities the state is trying to provide.

Leveraging women's land formalisation into improvements in women's outside option – such that they are able to shift household resource allocation closer to their preferences – is rendered particularly complex in conflict settings. Empirical evidence from developing countries, which tend to have tighter kinship ties, highlights that the importance of an individual's 'in-group' is heightened by conflict.⁸ Indeed, Cecchi et al. (2016) found that people victimised during Sierra Leone's civil conflict exhibited greater egalitarian motivation towards their 'in-group' and more antagonistic behaviour towards the 'out-group'. Cassar et al. (2023) found that conflict victimisation strengthens prosocial ties between parents, with the largest effect exhibited by

⁴Schling et al. (2023) found that a joint titling program in Ecuador led to a change in women's time allocation, with a shift towards non-agricultural work and earning off-farm wages. Brown (2003) found evidence that a larger dowry empowered women's intrahousehold bargaining power and resulted in less time allocated to unpaid care work.

⁵Dokken (2015) found evidence that after certification men in Ethiopia were allocated more land upon divorce than before the reform. Agrarian reform in Venezuela formalised at the level of the household, and although their prioritisation of female-headed households does provide additional rights to these women, it left the majority of women vulnerable in the event of divorce, as the rights were most often in the name of the man (Deere, 2017).

⁶Deere and Leon (2003) document outright rejections of laws imposing joint titling in Brazil and identify instances in Nicaragua where joint titling is wilfully interpreted as between father and son

⁷Jacobs and Kes (2015) discuss the importance of disseminating updated information about women's rights in parallel with joint titling programs. They find that in South Africa and Uganda women do not necessarily enjoy the fruits of joint titling in cases where there is disagreement about whether rights are truly joint. Lavers (2015) qualitatively investigated a joint land titling program in Ethiopia and found that while women found some support from courts and elders when they filed disputes, there was no evidence of systematic checks by the local government to ensure that women were being treated fairly in divorce proceedings or widowhood. If women must pursue claims through formal and informal channels this constitutes a significant barrier, particularly for the most vulnerable women.

⁸In contrast, literature suggests that conflict strengthens pro-social behaviours in western countries Henrich et al. (2010)

men, and destruction of property particularly reducing competitiveness in men. In the advent of weak institutions, family ties and other kinship ties take on preponderant importance.⁹ Existing research relating to the experience of conflict suggests the cost of defying social norms of your 'in-group', such as customary land ownership ones, could increase. Civil conflict may increase the cost women face for defying patriarchal social norms around land ownership in rural areas. This additional cost specific to post-conflict settings is omitted from usual Nash Equilibrium modelling of changes tenancy rights exert on intrahousehold bargaining power. The larger cost of transgressing social norms could alter the 'threat point' and result in no de facto change in women's rights following formalisation. Alternatively, if experience of conflict causes individuals to become more egalitarian and cooperative with their kinship group or 'in-group', conflict could reduce the intrahousehold bargaining power gap prior to any formalisation. If so, results in this paper would provide a lower bound as compared to impacts found in the wider population of non-victims.

The literature on land tenure post-conflict is sparse and qualitative in nature (Diepart and Dupuis, 2014; Beban et al., 2017; Tchatchoua-Djomo, 2018; Flower et al., 2023).¹⁰ The literature on human capital investment and female labour force participation in post-conflict settings offer some insights but there is as of yet no literature examining effects of restituted land tenure on human capital investments in post-conflict settings. Miguel and Roland (2011), Leon (2012), Akresh (2008), and Eder (2014) find evidence that human capital accumulation is disrupted by conflict, with exposure at a younger age leading to irrevocable losses. Mitra and Bang (2021) finds evidence that conflict particularly lowers educational accumulation of girls and female labour force participation. Justino (2012) discusses how conflict lowers educational attainment of children, particularly boys who are at high risk of recruitment. The conflict in Colombia has a long history of forced recruitment of young men (Downing, 2014), as such it seems important to explore whether vestiges of this trauma may remain in the form of gendered human capital investment decisions of households. Given the importance of human capital accumulation in breaking the inter-generational cycle of poverty triggered by displacement, it is crucial to assess whether a public policy of female empowerment through formal tenure security could lead to increases in educational attainment post-conflict. Households may view education as a protective strategy that would enable their children to escape any subsequent outbreak of violence, particularly given that it is an immaterial good and as such an investment which cannot be lost in the advent future conflict.

The contribution of this paper is twofold. Firstly, I provide the first empirical evidence of

⁹(Alesina and Giuliano, 2014) find evidence that women's paid labour supply falls commensurately with the strength of family ties

¹⁰Flower et al. (2023) evaluate attempts of post-conflict land tenure reforms in Sri Lanka; Diepart and Dupuis (2014) and Beban et al. (2017) in Cambodia; and Tchatchoua-Djomo (2018) in Burundi. These qualitative studies document the difficulties of implementing land tenure reform in post-conflict settings. One key difficulty raised is the imbalance in power between those seeking land tenure post-conflict and those who benefit from a less ordered land market. IDPs are vulnerable physically and socio-emotionally given their experience, and lack social and financial capital to adequately advocate for themselves when their claims are contested by large, powerful organisations that wish to maintain ownership or usufruct rights over areas of land. Diepart and Dupuis (2014) discuss the case of an attempted titling program in Cambodia after the civil war and subsequent Khmer Rouge dictatorship led to huge internal displacement. Ultimately the claims of IDPs often conflict with powerful interests and large agri-business, and are not granted (Beban et al., 2017).

the mid-term impacts of formalising women's land ownership rights in a post-conflict setting among households that experienced displacement during the armed conflict. Secondly, I exploit the mandatory joint titling of the policy to explore the mediating impact of a woman's initial intrahousehold bargaining power. In so doing I shed thereby shedding light on formalisation effects among women who would be too disempowered to be titled in a voluntary scheme. This heterogeneity has high relevance for policy-targeting. If a minimum level of bargaining power is necessary to benefit from the policy, then in practice it may primarily serve the most well-off women. However, if the policy is most effective for those with lower levels of empowerment, it could significantly enhance the social mobility of this particularly vulnerable group.

The remainder of the paper is structured as follows. Section 2.2 describes the data used to create the novel dataset, Section 2.3 explains the empirical strategy, Section 2.2.3 provides descriptives of the propensity score matching alongside balance tests, Section 2.4 presents and discusses results and Section 2.5 offers some concluding remarks and outlines an agenda for future research.¹¹

2.2 Data

I constructed a novel dataset that enables identification of households that were internally displaced and received formal land ownership through the restitution program between four to seven years prior. The dataset needed to identify these households geographically and over time, as well as to link households with an array of relevant outcome variables. Section 2.2.1 describes the four key data sources and Section 2.2.2 describes the methodology and steps taken to construct the final dataset.

2.2.1 Data Sources

The final dataset drew upon the 2014 Agricultural Census, the 2018 Demographic Census, the land boundaries of the eligibility areas from 2012 to 2018, and a shapefile of all land restituted by the policy between 2012 and 2018.¹²

The 2014 Agricultural census was provided in two distinct formats – the census response data files and a file with unique longitude/latitude coordinates with which to geolocate the census responses. The 2014 agricultural census datasets include responses from 1.38 million agricultural production units (UPAs) – the population of UPAs of Colombia. This included 226,462 census responses in which the main decision-maker reported having suffered displacement during the armed conflict. A unique identifier enabled me to match 184,945 (82%) displaced households with their georeferenced coordinate (point-level location), the remaining identifiers did not exist in the master file.

The 2018 demographic census was provided in two distinct formats – the census response data files, and shapefiles identifying censuses at the polygon-level. The 2018 census datasets were

¹¹Section 1.2 of the second chapter details the land restitution policy and implementation under study, so it is not repeated in this chapter.

¹²A shapefile is a digital vector storage format used in geographic information systems to store the location, shape and attributes of a geographic feature.

provided separately for each department, and within that by level: polygon section, dwelling, household, person. The location, size, and shape of the shapefile polygons were determined by Colombia's national statistics agency (DANE).¹³ The average size of the rural section polygon is 20 square kilometres.¹⁴

The land restitution shapefile provides geolocations of restituted parcels from Colombia's restitution process between 2012 and 2018.¹⁵ The deduplicated dataset yields 4,400 unique polygons.

2.2.2 Dataset Creation

This section details the methodology used to construct the dataset, emphasizing the challenges faced, decisions made, and innovative techniques employed to ensure precision and robustness in matching households across data sources.¹⁶

Step 1: Land restitution shapefile

I elected to analyse data at the polygon level, with one polygon representing one restituted household. This avoided arbitrary decisions about spatial contiguity thresholds (e.g., rook or queen adjacency) and spatial lags which could have introduced bias. Defining restitution too broadly risked omitting restituted households in the latter parts of the process, whereas defining it too narrowly would simply penalise the proportion of successful matches. For instance, between 2012 and 2014, 2,522 restitution polygons were identified in the shapefile compared to 1,006 cases in administrative data which I received from the Santos administration (described in Chapter 1). This discrepancy likely stems from contiguous polygons being treated as separate restitution cases in the land restitution shapefile, while the administrative data aggregates multiple restituted parcels to the same household.

Step 2: Intersecting the land restitution shapefile with the 2018 census shapefiles

This step was essential to link the restituted households to their outcome data in the 2018 census. Using a spatial intersection tool, I was able to locate almost all land restitution polygons inside a 2018 census polygons – 4,330 out of the 4,400 land polygons to be precise.

The next key decision was how to allocate a land restitution polygon if it straddled more than one rural/urban section polygon. The rural section shapefile contained 5,766 rows after intersection. Specifically, 3,176 of those restitution polygons were fully located in one rural section polygon. 1,706 land restitution polygons spanned two rural section polygons. And 348 restitution polygons spanned three rural polygons. I decided to assign the restitution polygon to the rural/urban polygon which held at least 50% of the restituted land. This resulted in 4,115 land restitution polygons identified in the rural section shapefile and 185 land restitutions in urban polygons.

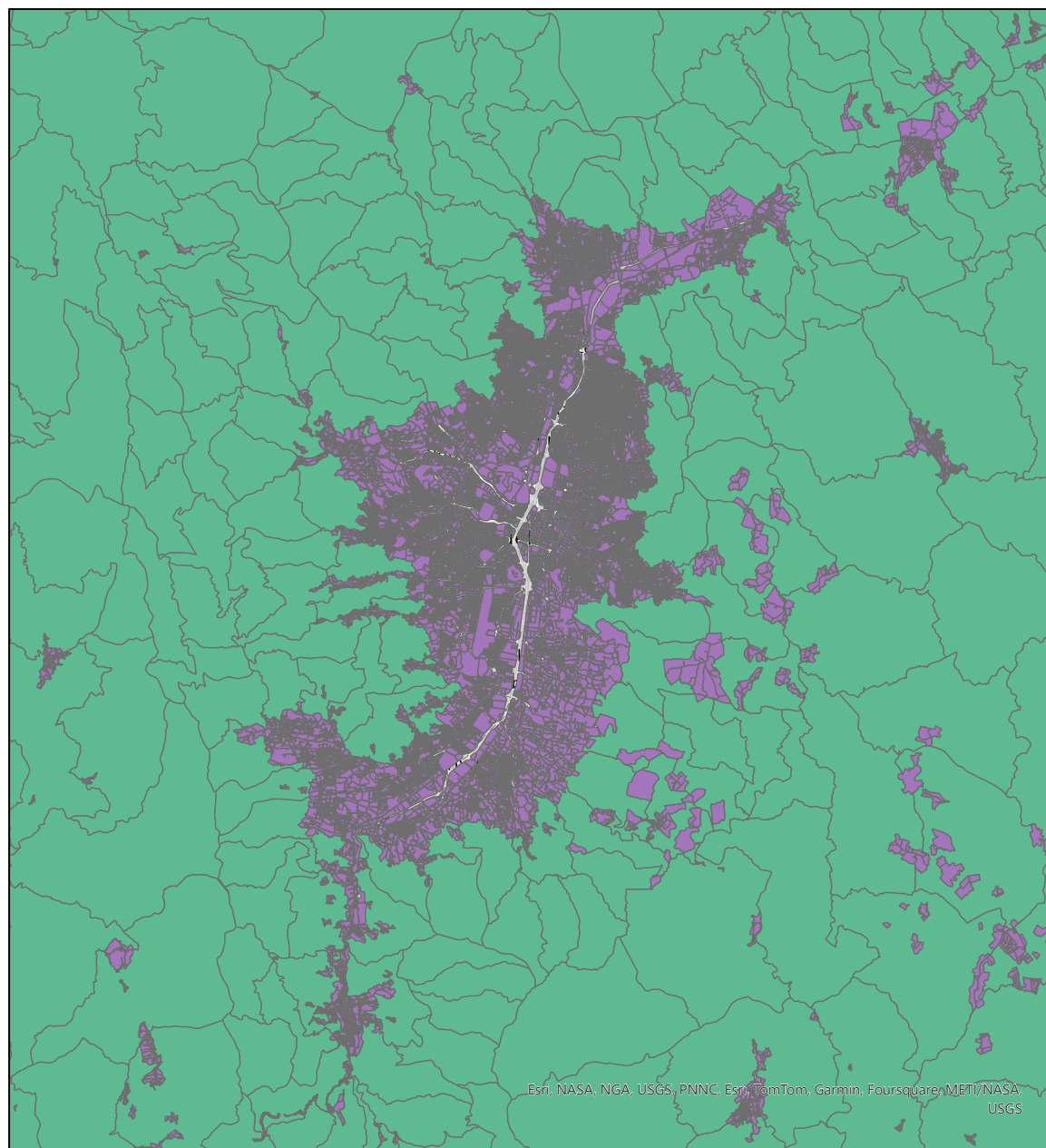
¹³DANE distinguishes Colombia spatially through 46,000 rural polygons and 504,996 urban polygons.

¹⁴The average size of the urban section polygon is much smaller, as illustrated in Figure 2.1.

¹⁵The shapefiles defining the eligibility of the land restitution process between 2012 and 2018, as well as the location of land restitution, were downloaded from the land restitution unit website in October 2019.

¹⁶The dataset creation involved working across four programs – Stata, ArcGIS, Python, and R.

Figure 2.1: Map of Urban and Rural Polygons – Medellin

**Legend**

- Urban Section
- Rural Section

0 2.38 4.75 9.5 Kilometers

Step 3: Intersecting the land restitution shapefile with the 2014 census shapefiles

This step was essential to link the restituted households to their outcome data in the 2014 census. Two shapefiles are spatially joined in order to identify as many of the 2,522 land polygons which were restituted by 2014, inside the 2014 census. In order to allow for measurement error in the precise location of land borders I created a 500 metre buffer around each piece of restituted land. To reflect that the size of the error is a function of the size of the land being restituted, I added 50% of the length of the restitution polygon to the buffer. Given that a length in metres cannot be added to an area, I first converted the polygon's size into a length by taking the square root of the area of the polygon. This in effect reduces all differing sized polygons to squares for the purpose of finding the length. Rather than performing a naive nearest neighbour match, which would leave orphans (i.e. certain matches would have higher validity, but several would be very poor), I used the Hungarian algorithm which minimises the average geographic distance between all matches within the aforementioned constraint.

To do this I use the 'linear sum assignment' package from SciPy which implements a modified version of the algorithm found in Jonker and Volgenant (1987) titled 'A shortest path algorithm for dense and sparse linear assignment'. This in effect minimises a cost function across my entire system, where the cost is the distance between 2014 census points and land restitution polygons. In ArcGIS, I created the input matrix required to run the algorithm in SciPy – the full distance matrix of my displaced households and census points which resulted in a file with 9,270,872 rows (3,676 displaced household points multiplied by 2,522 restitution polygons). Using this method and restricting to households who were displaced and have returned to their land, I obtain 838 unique matches between 0 and 500 metres + 50% of the length of the restitution polygon, with a mean distance of 197 metres.

Step 4: Preparing the 2014 and 2018 census datasets for matching

Since the 2018 census is identified at a higher level than the 2014 census, I intersect the two layers in order to assign the apposite rural/urban section identifiers to each 2014 point. I then create a dataset of the 2014 census treated households which includes the variables I will use to match the 2014 and 2018 censuses. My choice of matching variables is constrained by the variables which appear in both censuses and are plausibly unaffected by the treatment. Ultimately, the chosen variables are education, ethnicity, age, marital status, gender, and polygon identifier. I retain these variables at the household head level. In terms of the 2018 census, having appended all relevant datafiles across departments, I created the matching variables.

The age, education, and marriage variables required a re-categorisation of the response options in order to match across the 2014 and 2018 censuses. The age of respondents in the 2018 census was only provided in four year age brackets, so I matched the 2014 age data structure to that of the 2018 census.¹⁷ In terms of marital status, which existed in the 2018 census questionnaire but not in the 2014 census questionnaire, I created the 2014 variable based on a person's relationship to the head of the household. If the household included an individual who identified as the

¹⁷To do so I took the age of the household head in 2014, added four years, then coded it into the age bracket they would be categorised into in the 2018 census.

household head, and another who identified as the spouse of the head, I coded them both as married. Finally, the education variable response options were slightly different across the two censuses so I conflated categories to ensure a compatibility for matching.

Step 5: Matching treatment groups between 2014 and 2018 census datasets

I successfully performed exact matching based on the five variables: household head education, household head gender, household head marital status, household head ethnicity and household polygon code. I was able to match 547 of the 596 households across 2014 and 2018.¹⁸ Figure 2.A.4 in the Appendix highlights that the composition of households in the treatment group between 2014 and 2018 were disparate prior to matching, and similarly for the control group. Figure 2.A.5 shows that the exact matching yielded at least one match for every 2014 unit.

The variables on which I ran the exact match did not uniquely identify every 2018 match household. There were 29,409 potential matches for the 547 households. Six percent of the 547 households were matched to 20 or fewer household in the 2018 census. However, the mean number of matches per household was 222, with a minimum of one and a maximum of 272. Therefore, I randomly selected a 2018 match for each of the available matches. In order to mitigate concerns that my random selection has biased the results, I undertook 25 separate random draws (setting 25 unique seeds for replicability). This created 25 datasets with distinct treatment matches, the descriptives of which are in Table 2.1. The means in Table 2.1 are relatively similar, but to mitigate any concern of bias, I present results for each of the 25 datasets in my results section. This is essentially a bootstrapping exercise, which conventionally involves more than 25 iterations. However, due to computational constraints I am only able to undertake 25.

¹⁸Of the 838 households, only 596 were found to be married.

Table 2.1: Descriptives of 25 Random Draws – Treatment Households

Random Draw	Age Head (age bracket)	Female Head	House- hold Size	House- hold members aged 15–70	Female household members aged 15–70	Male household members aged 15–70	House- hold members 19 or under	Female house- hold mem- bers	Female household members 19 or under	Elec- tricity Access	High Quality Walls	Low Bar- gaining Power
1			3.58	2.59	1.25	1.45	1.82	1.69	1.30	0.87	0.77	0.38
2			3.46	2.53	1.21	1.43	1.84	1.69	1.38	0.87	0.77	0.37
3			3.64	2.62	1.27	1.46	1.91	1.75	1.37	0.86	0.76	0.39
4			3.66	2.67	1.27	1.52	1.80	1.72	1.30	0.88	0.80	0.36
5			3.49	2.56	1.25	1.39	1.72	1.74	1.31	0.89	0.77	0.39
6			3.50	2.57	1.22	1.47	1.69	1.64	1.27	0.87	0.76	0.37
7			3.57	2.57	1.22	1.46	1.84	1.73	1.34	0.84	0.78	0.39
8			3.53	2.60	1.27	1.44	1.77	1.72	1.29	0.89	0.77	0.37
9			3.53	2.60	1.28	1.43	1.76	1.70	1.29	0.87	0.78	0.38
10			3.52	2.53	1.24	1.41	1.76	1.69	1.30	0.86	0.77	0.39
11			3.62	2.57	1.24	1.43	1.82	1.73	1.31	0.86	0.78	0.38
12			3.54	2.58	1.25	1.42	1.79	1.71	1.34	0.87	0.77	0.34
13	45–49	7%	3.64	2.64	1.25	1.47	1.79	1.71	1.38	0.88	0.78	0.39
14			3.60	2.60	1.23	1.49	1.82	1.71	1.41	0.88	0.80	0.38
15			3.54	2.59	1.24	1.45	1.75	1.67	1.33	0.87	0.77	0.37
16			3.60	2.58	1.26	1.44	1.77	1.74	1.31	0.86	0.75	0.39
17			3.47	2.58	1.24	1.46	1.71	1.67	1.31	0.87	0.77	0.35
18			3.66	2.63	1.27	1.47	1.85	1.79	1.30	0.88	0.79	0.42
19			3.60	2.56	1.23	1.44	1.88	1.73	1.31	0.87	0.78	0.39
20			3.55	2.60	1.28	1.43	1.80	1.73	1.35	0.86	0.80	0.37
21			3.62	2.58	1.29	1.43	1.84	1.78	1.41	0.86	0.76	0.39
22			3.60	2.55	1.24	1.42	1.79	1.67	1.30	0.88	0.77	0.39
23			3.49	2.56	1.25	1.41	1.78	1.70	1.31	0.86	0.80	0.37
24			3.60	2.60	1.25	1.45	1.86	1.71	1.34	0.87	0.78	0.38
25			3.57	2.59	1.24	1.44	1.84	1.71	1.38	0.87	0.78	0.38

Table 2.2: Descriptives of 25 Random Draws – Control Households

Random Draw	Age Head (age bracket)	Female Head	House- hold Size	House- hold members aged 15–70	Female household members aged 15–70	Male household members aged 15–70	House- hold members 19 or under	Female house- hold mem- bers	Female household members 19 or under	Elec- tricity Access	High Quality Walls	Low Bar- gaining Power
1			3.47	2.55	1.22	1.43	1.84	1.69	1.29	0.83	0.60	0.35
2			3.48	2.52	1.22	1.40	1.81	1.72	1.31	0.82	0.60	0.37
3			3.50	2.50	1.21	1.39	1.82	1.73	1.33	0.82	0.59	0.35
4			3.48	2.52	1.22	1.41	1.77	1.73	1.37	0.83	0.59	0.36
5			3.48	2.49	1.23	1.38	1.80	1.72	1.31	0.82	0.58	0.35
6			3.48	2.49	1.21	1.39	1.78	1.71	1.30	0.82	0.60	0.35
7			3.47	2.47	1.20	1.37	1.83	1.73	1.36	0.81	0.57	0.37
8			3.46	2.51	1.22	1.41	1.78	1.72	1.31	0.82	0.58	0.36
9			3.45	2.51	1.24	1.36	1.79	1.75	1.32	0.81	0.58	0.37
10			3.47	2.51	1.23	1.38	1.83	1.74	1.32	0.82	0.58	0.36
11			3.45	2.51	1.22	1.39	1.74	1.72	1.30	0.82	0.58	0.38
12			3.48	2.54	1.24	1.41	1.79	1.72	1.36	0.83	0.58	0.35
13	45–49	9%	3.57	2.56	1.21	1.43	1.84	1.75	1.36	0.83	0.60	0.37
14			3.56	2.57	1.25	1.42	1.83	1.74	1.34	0.82	0.58	0.35
15			3.55	2.57	1.25	1.43	1.83	1.74	1.31	0.83	0.60	0.35
16			3.52	2.53	1.23	1.40	1.85	1.77	1.37	0.82	0.57	0.37
17			3.47	2.50	1.22	1.38	1.82	1.73	1.31	0.82	0.59	0.35
18			3.53	2.55	1.23	1.43	1.77	1.74	1.30	0.82	0.59	0.38
19			3.51	2.53	1.23	1.39	1.78	1.76	1.35	0.82	0.58	0.37
20			3.55	2.54	1.22	1.42	1.83	1.74	1.30	0.82	0.58	0.37
21			3.56	2.55	1.25	1.38	1.86	1.76	1.33	0.84	0.60	0.38
22			3.55	2.55	1.24	1.43	1.91	1.77	1.39	0.82	0.58	0.37
23			3.50	2.49	1.21	1.40	1.76	1.69	1.27	0.82	0.58	0.36
24			3.56	2.54	1.22	1.42	1.86	1.75	1.35	0.82	0.58	0.35
25			3.49	2.51	1.21	1.41	1.84	1.74	1.32	0.81	0.58	0.36

Step 6: Identifying control households in the 2014 census dataset

In order to create a valid counterfactual in the 2014 census, I exploit the random borders that designate which areas of Colombia were eligible for land restitution in 2014 shown in Figure 2.2a. The criteria the government used to determine these borders did not follow any other administrative borders, and grew quickly as shown in the expansion of eligibility the following year in Figure 2.2b. As such there is little concern that by taking advantage of the relative exogeneity of the border this analysis could be capturing effects attributable to another government policy.

Step 7: Matching 2014 control households with 2018 control households

In R, I ran the script as explained in the treatment matching section. Of the 5,258 households displaced in 1991 or after, who had returned, were married, owned the property and were located within a 5 km radius of the border, I found exact matches for 1,306 of them. There were 71,910 matches for the 1,306 households in 2014, 7% of the sample was matched to 20 or fewer households in 2018. Each 2014 was matched to a mean of 99 households in 2018. The minimum was one-to-one match and the maximum was one to 329.

When I randomly select one 2018 household for each 2014 household without allowing replacement the number falls from 1,306 to 1,240 control households in the 2018 census.

As with the treatment group creation, I run 25 random draws among the potential matches for 2014 households. Table 2.2 below shows the means for key variables.

In ArcGIS, I projected a map of the eligibility border in 2014. I overlaid the 2014 census points and used the border to identify the displaced households that lay within a 5km radius of the border. There were 22,743 displaced households within 5km of the borders and 14,664 inside the borders.¹⁹

I restricted the selected census points within a 5km radius to those who were displaced by the armed conflict, were married, owned their land, had returned, and were displaced after 1991.²⁰ This left me with 5,233 unique control households across 995 distinct polygons.

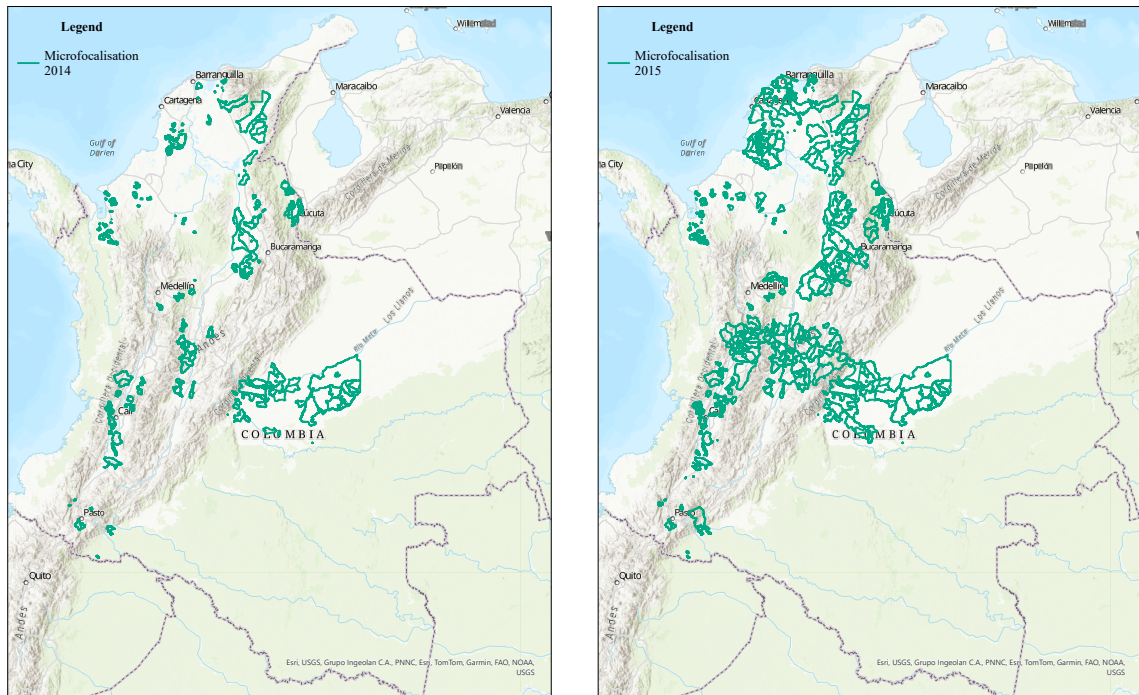
¹⁹I ran a t-test to ascertain whether the probability of displaced households returning was higher inside the eligibility area and found that it was, at a 1% significance level, thereby providing more credibility to the identification strategy. Areas eligible for land restitution had significantly more returnees than areas that were not eligible.

²⁰Note that several households reported multiple instances of dispossession (96% reported one instance of dispossession, 3% reported two and 1% reported three). If at least one of those instances was in 1991 or after I coded that year as the apposite year since it meets the temporal requirement for land restitution eligibility

Figure 2.2: Evolution of Land Restitution Eligibility Borders

(a) 2014

(b) 2015



Step 8: Creating the final dataset

In STATA, I convert the datasets from wide to long. Having shown in Table 2.2 that the datasets I randomly selected for the control group were similar, I use the first random selection of control households and used that random draw to create the 25 datasets for each of the 25 random selections of treatment households. That ensured that the only difference in the 25 datasets I loop through are the treatment households.

Step 9: Triangulating the treatment households with administrative data on treated households

I use the administrative dataset provided to me by the Santos administration to triangulate the number of land restitution cases I found through my dataset creation process.²¹ The administrative dataset provides information on the 87,117 claims for land restitution submitted to the land restitution unit between 2012 and 2015.²² It details among other things the outcome of the restitution claims by 2015 alongside the applicant's marital status. With this dataset I am able to ascertain that 1,006 successful land restitution cases were registered by 2014 (inclusive), and 605 of them were provided to married couples. So, comparing the ratio of married households to total restituted households in the Santos dataset and in the outcome of my dataset creation,

²¹The Santos administration ratified the 'Ley de las Víctimas' law and implemented the land restitution policy until the change of administration in 2018.

²²Section 1.2 of the first chapter ('Effects of Land Restitution on Agricultural Investment Decisions in a Post-Conflict Setting') of this thesis details the land restitution policy and implementation under study, so is not repeated in this chapter.

the numerator is similar – Santos' administration recorded 605 married restituted households, I found 596, and matched 547. The denominator differs – the administrative dataset suggests 1,006 households were restituted, whereas I started with 2,552 based on the land restitution shapefile. There are several reasons for this outcome for the denominator.²³ As explained earlier, I made the decision to treat each polygon of land as a separate instance of restitution because of the arbitrary rules on contiguity threshold cut-off that I would have had to impose otherwise. However, it is possible, even probable, that several contiguous polygons may be allocated to the same restituted household. Indeed, in the administrative dataset 50% of individuals requested restitution for one parcel of land but 19% were seeking restitution for two parcels, 8% for three, and 14% for four or more. As I had to create a proxy for marriage in the 2014 census, if the spouse was not present they would drop out of my sample. If the day of the census no household member is available to provide responses, that household will drop out of my sample.

2.2.3 Descriptives Statistics

Table 2.3 shows sample sizes and mean values of age, education, household size, and fertility in the treatment and control groups, averaged across the 25 randomly sampled datasets. Fathers in both treatment and control groups are on average 45–49 years old.²⁴ Mothers are on average aged 40 to 44. The majority of spouses are educated to the same level (61% couples in the treatment and 58% couples in the control). In instances of differing educational attainment, the wife is on average more educated than her spouse (27% couples in treatment and 29% in control). The 2014 census data indicates that on average only 18% of women nationally are more educated than their spouse. This highlights that women spouses in the sample are from disproportionately educated families and likely have a relatively strong intrahousehold bargaining position in both the control and treatment. These households may be more likely to conform to a cooperative bargaining model than households in which the wife is substantially less educated than the husband. This suggests results from this paper may be a lower bound of impacts that could be expected if a policy to formalise women's land ownership rights were expanded to include women with the lowest initial intrahousehold bargaining power.

I undertake heterogeneity analysis by level of initial bargaining power to explore this mediating factor further. Age at first marriage is commonly used to measure a woman's intrahousehold bargaining power (Heath and Tan, 2020; Doss, 2013; Field and Ambrus, 2008). Although I do not dispose of data on the age a woman married, Chari et al. (2017) find a strong correlation between age of first birth and age of marriage. Thus, I explore age at first birth measure as a proxy for a woman's intrahousehold bargaining power. Table 2.3 illustrated that the proportion of women with low initial intrahousehold bargaining power is constant across groups (17% of women).

On average households have between three and four members, most of which are aged 15 to 70 years old. In both the treatment and control group there are slightly more teenage boys than teenage girls. On average women in the treatment group have had relatively fewer children than

²³The implication of potential non-treated households in the treatment group is that - in the same manner as an intent to treat - the estimates are lower bounds.

²⁴Age is provided in four year age bracket increments in the 2018 Demographic Census.

in the control, but this difference is statistically insignificant. The very small sample size of households headed by women which include a male spouse highlights the patriarchal societal norms at play.

Table 2.4, Panel B details the control variables included in each regression. Historical violence was a factor in the government's decision of which areas of land to render eligible for land restitution. The geospatially proximate nature of the control and treatment groups mitigate concern that fundamental differences in history, infrastructure or institutions exist between the groups which could lead to endogeneity, but I also control for historical violence in the regression. I also control for the number of household members relevant to each outcome. It would have been desirable to include additional controls however the others variables available in the census could plausibly have been affected by the treatment and therefore including them in the specifications would have introduced bias.

As shown in Panel D of Table 2.3, the human capital investment I examine is school attendance. As well as assessing effects among ten to nineteen year olds, I explore effects among fifteen to nineteen year olds.²⁵ Given that school is mandatory in Colombia up to fourteen years old, one might expect the older margin to be most responsive to treatment. I disaggregate by gender to explore any such heterogeneity in effects. The decision to show intensive margin schooling outcomes rather than extensive margin ones is conscious, as research has shown that absenteeism is linked to high drop-out rates and exam failure (Marburger, 2001; Gottfried, 2009; Gershenson et al., 2017).

Panel D of Table 2.3 also describes the labour supply variables, namely the main activity that women and men in the household reported undertaking in the previous week. Response categories are based on the 2018 demographic census question "Which of the following was your main activity in the past week?". The gendered occupational split is stark – 84% of adult men engaged in income-generating work or were seeking income generating work whereas 85% of adult women reported unpaid care work as their main activity. This contrast is likely partly driven by the lack of multiple response options provided in the question. But, also related to the patriarchal structure of Colombian Society. Alesina and Giuliano (2014) find evidence that in countries with tighter knot family ties, women's labour force participation is low and women predominantly provide unpaid domestic care work. Given this occupational segregation I focus on these two main categories of labour activity – unpaid care work and income-generating work/seeking income-generating work.

Panel C of Table 2.3 details the mediating variables I explored. I define a binary variable that takes the value of one if either of two conditions are met: the woman gave birth to her first child by the age of nineteen, or there is a substantial age gap between her and her spouse.

²⁵The age range was determined by the questionnaire routing – the question of last week's activity was only asked of individuals aged 10 or above.

Table 2.3: Descriptives (Averaged Across 25 Random Samples)

VARIABLE	Unit	Mean Treatment	Mean Control	# Obs. Treatment	# Obs. Control
Age Father	Years	45–49	45–49	475	1,061
Age Mother	Years	40–44	40–44	486	1,088
No Education Gap	Percentage	61%	58%	486	1,088
Husband > Wife (Education)	Percentage	11%	10%	486	1,088
Husband < Wife (Education)	Percentage	27%	29%	486	1,088
Number Children under 4	Individuals	0.25	0.28	486	1,088
Low Bargaining Power	Percentage	38%	35%	486	1,088
High Violence	Percentage	39%	35%	486	1,088
Household Size	Individuals	3.57	3.56	486	1,088
Household Size, People (aged 10-19)	Individuals	1.54	1.57	235	540
Household Size, People (aged 15-19)	Individuals	1.24	1.23	140	330
Household Size, Girls (aged 10-19)	Individuals	1.21	1.23	134	322
Household Size, Girls (aged 15-19)	Individuals	1.08	1.09	70	168
Household Size, Boys (aged 10-19)	Individuals	1.27	1.30	158	346
Household Size, Boys (aged 15-19)	Individuals	1.14	1.10	86	201
Low Bargaining Power (Robustness)	Percentage	52%	51%	353	758

Note: Sources: 2018 Demographic Census; CERAC

Table 2.4: Variable Description

VARIABLE	DESCRIPTION
<i>Panel A: Matching Variables</i>	
Age	Ordinal variable of household head age four-year brackets
Education	Categorical variable denoting the highest education level achieved; ranges from no education to postgraduate education
Ethnicity	Categorical variable denoting the ethnicity of the household head
Marital Status	Binary variable equal to one if household head is married, zero otherwise
Gender	Binary variable equal to one if household head is a woman, zero if the head is a man
Polygon Code	Unique identifier from Colombia's national statistics agency locating the spatial location of a household
<i>Panel B: Control Variables</i>	
People [10–19; 15–19]	Number of individuals in household aged 10–19 or 15–19, respectively; these were controls in the school attendance regressions
Female/Male People [10–19; 15–19]	Number of female/male individuals in household 10–19 or 15–19, respectively; these were controls in the school attendance regressions disaggregated by gender
Female People aged 15–70	Number of female individuals in household aged 15–70; this was a control for the labour supply model
Historical Level of Violence	Binary variable that takes the value of one if the household is in a municipality that experienced high levels of violence during the period 2001 to 2012, zero otherwise.
<i>Panel C: Measures of Bargaining Power</i>	
Low Bargaining Power	Binary variable which takes a value of one if the married woman gave birth to her first child at nineteen or younger, or has a large age gap with her spouse; takes the value of zero if she gave birth to her first child at twenty or older or has no child

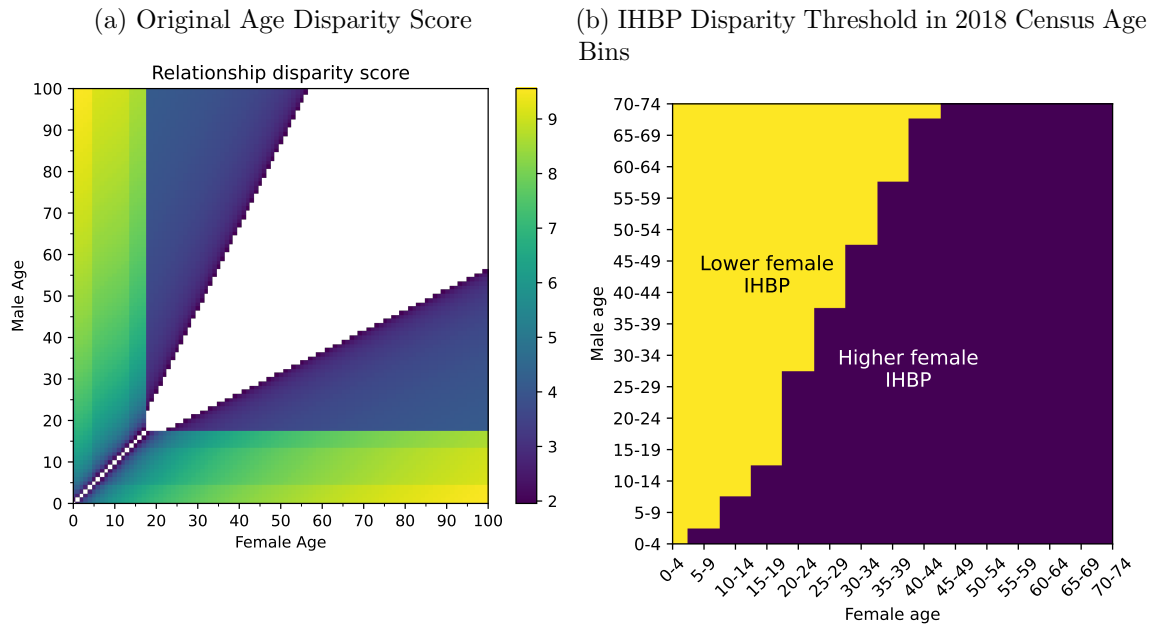
Low Bargaining Power (Robustness, Bargaining 19)	Binary variable which takes a value of one if the married woman gave birth to her first child at nineteen or younger; takes the value of zero if she gave birth to her first child at twenty or older; this measure excludes women who have no child
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Panel D: Outcome Variables

Attendance [10–19 year olds/15–19 year olds]	Binary which takes a value of one if the household includes individuals aged 10–19/15–19 who reported that attending school was their main activity last week; it take a zero value if the household contains any child in that age group of which none attended school last week
Attendance – Girls [10–19 year olds/15–19 year olds]	Binary which takes a value of one if the household includes any female individuals aged 10–19/15–19 who reported that attending school was their main activity last week; it take a zero value if the household contains any child in that age group of which none attended school last week
Attendance – Boys [10–19 year olds/15–19 year olds]	Binary which takes a value of one if the household includes any male individual aged 10–19/15–19 who reported that attending school was their main activity last week; it take a zero value if the household contains any child in that age group of which none attended school last week
Women Labour Supply – Chores	Binary which takes a value of one if the household includes any adult woman aged 15–70 who reported unpaid care work as the main activity in which they engaged during the previous week; it takes the value zero if the household contains any adult woman who did not report unpaid care work as her main activity
Women Labour Supply – Income/Seeking	Binary which takes a value of one if the household includes any adult woman aged 15–70 who reported the main activity in which they engaged during the previous week was paid work or that they were seeking work; it takes the value zero if the household contains any adult woman who did not report paid work or seeking work as her main activity

Note: This table describes the key variables used in the analysis. Age brackets begin 0–4 years, 5–9 years, 10–14 years, 15–19 years, etc. The three ethnicity categories are 'Indigenous', 'Black/Afrodescendent/Afrocolombian', and 'No Ethnic Group'.

Figure 2.3: Age-Related Intrahousehold Bargaining Power Disparity Matrices.



Existing literature offers little consensus on what constitutes a significant or harmful age gap (Oreffice, 2011, 2014; Gobbi et al., 2018). Therefore, my approach reflects a pragmatic assumption grounded in the dynamics of age and power imbalance. The age gap threshold was constructed using a linear rule that scales with the woman's age at marriage, based on the premise that large age differences are more likely to undermine bargaining power when the woman is younger. This rule was then adapted to fit the binned age categories in the 2018 census data.

Figure 2.3a shows the shape of the resulting threshold rule and Figure 2.3b shows the shape once the age bin constraint is taken into account. Under this framework, women were coded as one if, for example, a 19-year-old was married to a man aged 30 or older, a woman married by age 24 had a spouse aged 40 or older, or a woman married by 29 had a spouse aged 55 or older. The variable takes the value of zero for all other cases, including when the woman has no children.

As a robustness check I define an alternative measure of low bargaining power based solely upon the age at which a woman gives birth to her first child.²⁶ The alternative age-at-birth dummy takes the value of one if a married woman gave birth to her first child at or before nineteen.²⁷ Women in 470 households had not given birth, and therefore were excluded from this heterogeneity analysis in order to maintain a clear mechanism for this robustness check.²⁸

²⁶I explored an alternative measure of initial intrahousehold bargaining power using the education gap between spouses following Bertocchi et al. (2014). Households in which the women have higher educational attainment than their husbands were categorised as high initial bargaining power. Households in which men have higher attainment were considered low initial bargaining power, and ones in which educational attainment is equal were considered households in which both partners enjoyed similar bargaining power. There was notably little variation in intra-partner education – the majority of couples have the same education level. Over 60% of the sample was comprised of couples with the same educational attainment rendering meaningful inference about the impact of high bargaining power negligible.

²⁷I explored creating a binary for first birth at fourteen or below but only 17% of the sample met this criteria, too small a sample to draw any meaningful inference.

²⁸This variable excludes married women who had no living children at the time of the census, I am also unable to capture still-births or infant mortality in the measure.

2.3 Empirical Approach

2.3.1 Empirical Specification

Equation (2.1) presents the main specification.

$$y_{hm} = \alpha_0 + \beta_1 \text{Formalisation}_{hm} + \psi' \mathbf{X}_{hm} + \eta \Theta_m + \epsilon_m \quad (2.1)$$

y denotes the outcome of interest, of which there are two categories – human capital and labour supply (described in Table 2.3). α_0 denotes a constant, *Formalisation* indicates the woman in household h living in municipality m is formally named on the property deed. $\mathbf{X}$ represents a vector of household level control variables consisting of the number of household members disaggregated by gender or age group relevant to the regression. Θ represents the municipality-level control of historical violence. ϵ represents the error term. Standard errors are clustered at the municipality-level

To investigate the mediating effect of a woman's initial bargaining power prior to land ownership I include an interaction term²⁹ as shown in Equation 2.2.

$$y_{hm} = \alpha_0 + \beta_1 \text{Formalisation}_{hm} + \beta_2 \Upsilon_m + \beta_3 (\text{Formalisation}_{hm} * \Upsilon_m) + \psi' \mathbf{X}_{hm} + \eta \Theta_m + \epsilon_m \quad (2.2)$$

Where Υ_m denotes the binary bargaining power variable which takes a value of one if the woman had low initial intrahousehold bargaining power and zero otherwise.³⁰ I run an OLS model with errors clustered at the municipality level.

2.3.2 Identification Strategy

The steps taken to create a dataset identifying treatment and control groups that enables causal inference of the effect of formally naming a woman on property deeds, in Colombia's post-conflict setting, are detailed in Section 2.2.2. The treatment group is constituted of women in households that were displaced by the armed conflict after 1991, who are married, who have returned to their land, who own their land and who were restituted through the governmental policy by 2014. This ensures that the treatment group has been restituted for at least four years and up to seven years, thereby enabling a mid-term analysis of effects. To isolate the effect of formally naming women on the deeds I created a control group that is as comparable to the treatment as possible. It is constituted of women in households that were displaced by the armed conflict after 1991, who are married, who have returned to their land, who report owning their land. The central difference is that they were not restituted land through the government program for a relatively exogenous reason – because the land was not yet eligible. These control households are within 5

²⁹As a robustness check I also undertake a split sample analysis. The split sample results are derived by running Equation 2.1 twice, separately by bargaining power realisation. Whereas the interaction approach holds all controls constant except for the bargaining power variable, the split sample allows all controls vary between high and low initial bargaining power regressions.

³⁰Details of the bargaining power measure are detailed in Section 2.2.3.

km outside of the border of the eligibility for land restitution. This spatial contiguity mitigates concerns that the areas in treatment and control groups are significantly different in terms of institutions, infrastructure and economy. As explained in Section 2.2.2 only certain parts of Colombia were eligible for land restitution, the areas were decided upon by the national security council based on three things – local security conditions, historical density of dispossession and conditions of return (Art. 76 of Law 1448; Decree 599 of 2012). These borders do not follow any other administrative boundaries and as such are exogenous to alternative government policies. As shown in maps 2.2a and 2.2b, the area of eligible land increased steadily over time, and most land bordering the 2014 area became eligible in 2015.

The pivotal fact is that households outside of the eligibility area cannot be restituted land through the government policy. The rate of farmers who hold written rights to their land in rural areas of Latin America and the Caribbean is low. However, many will state that they own their land if the survey does not specifically query a written deed. Moreover, as discussed by Meertens (2015) and Restrepo et al. (2014) even in the case a household formally owns land the woman is unlikely to be named on the deed without explicit mandates for joint titling.³¹

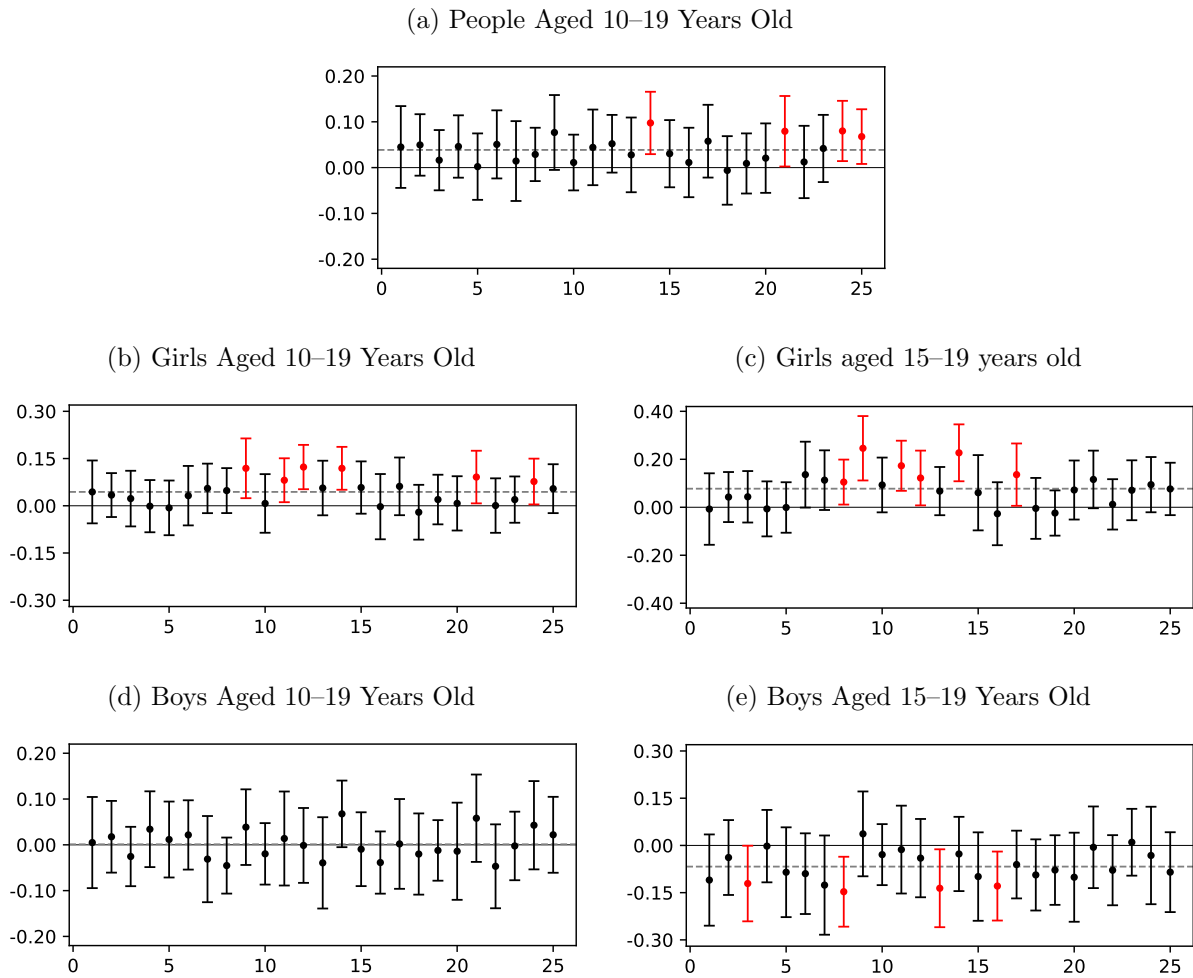
Nonetheless, if married women in the control group are named on their property deed this would attenuate the effect of treatment and lead to lower bound estimates. Similarly, the fact that households in the control group were able to return and own their land without the support of the government program suggests that they may hold additional socio-economic capital than some of those in the treatment group who might not have managed to own their land without the support of the land restitution program. The direction of that bias would also work against finding an effect.

2.4 Results

The main estimation, depicted in Equation (2.1), sheds light on the effect of formally naming married women on the title deed of their land in a post-conflict restitution reform policy. To investigate heterogeneity of the impact by a woman's initial intrahousehold bargaining power, I examine estimations obtained from Equation (2.2). This specification includes an interaction term to capture the mediating effect of a women's intrahousehold bargaining power prior to restitution. Results are plotted for each outcome, and detail effect sizes across the 25 datasets. If a regression coefficient is statistically significant at the 10% significance level the confidence interval is depicted in red. A result is deemed significant on aggregate if the proportion of statistically significant results across the 25 samples is above 0.9, which corresponds to a 90% confidence interval. The plots of results from Equation (2.1) show the treatment coefficient on women's formal land ownership. The plots of results from Equation (2.2) show the treatment coefficient from a linear combination of $\beta_1 + \beta_3$ from Equation (2.2), which is the effect on outcome y of a woman with low initial intrahousehold bargaining power receiving formal property rights.

³¹Meertens (2015) describes women are seldom named on land deeds in Colombia and disproportionately informally own land Restrepo et al. (2014).

Figure 2.4: Children's School Attendance

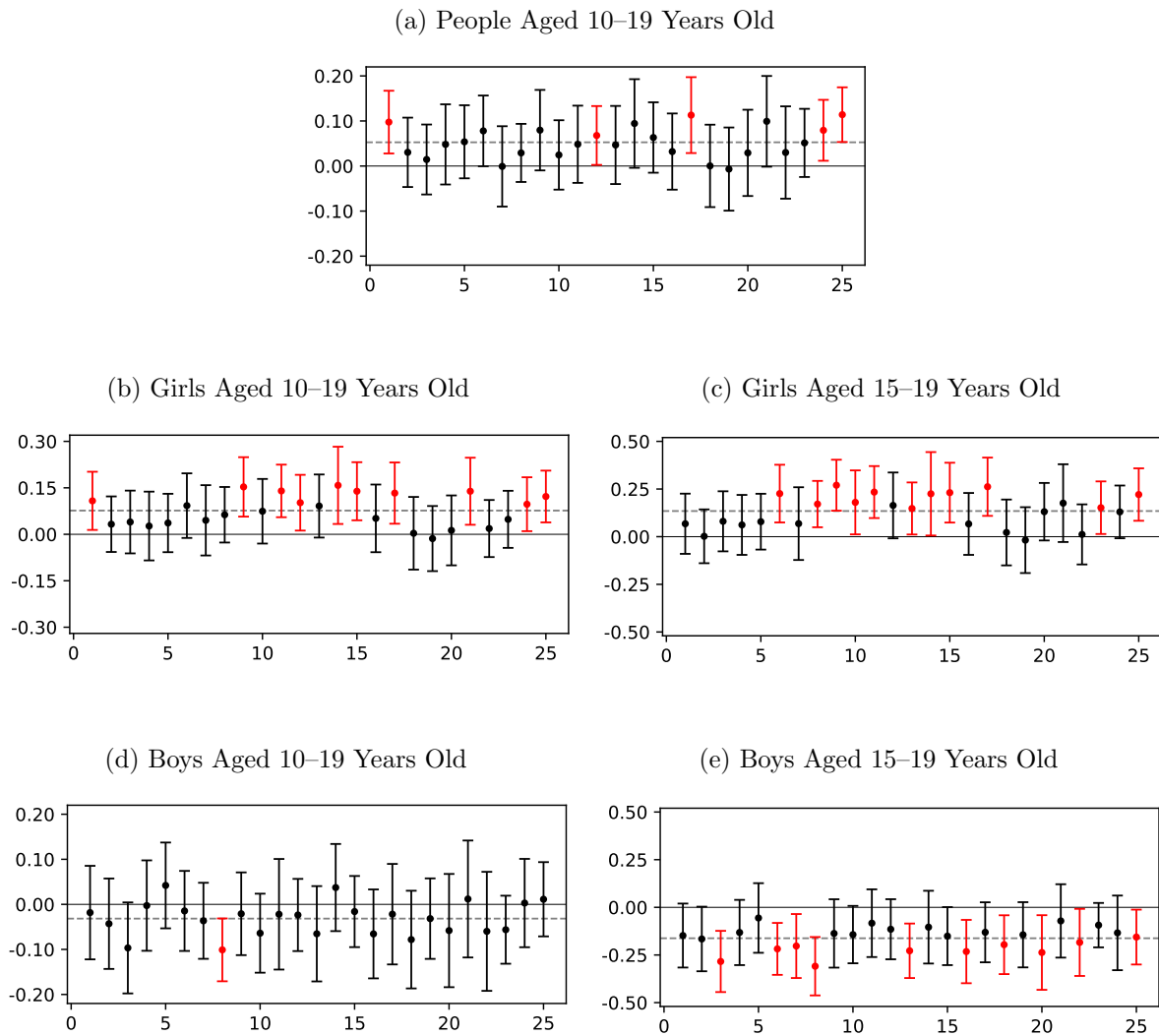


Note: Plots in this figure show results from Equation 2.1. Of all households in the control group with children aged 10 to 19, at least one child attended school last week in 73% of cases. Of all households in the control group with women aged 10 to 19, at least one child attended school last week in 70% of cases. This fell to 48% for the women in age group 15 to 19. Of all households in the control group with men aged 10 to 19, at least one child attended school last week in 72% of cases. This fell to 54% for the men in age group 15 to 19. All regressions include controls for the relevant number of children in the household age group and the binary for historical violence in the municipality alongside standard errors clustered at the municipality-level.

Figure 2.4 shows the effects of women's formal land ownership on children's school attendance. Overall results in Figure 2.4 are insignificant at conventional levels. To investigate whether upon receiving land ownership mothers with previously relatively lower intrahousehold bargaining power exhibit a preference for equalising access to education of daughters, I interact treatment with mother's bargaining power in Figure 2.5. The insignificant results for attendance of 10-19 year olds in panel (a) conceal notable heterogeneity by gender of child. Panels (b) and (c) suggest that it is households in which the mother had the lowest initial intrahousehold bargaining power where daughter's attendance is most increased by women's formal land ownership.

Although only suggestive in their overall statistical significance, these results are robust to the alternate specification of bargaining power and the alternate model specification (Figure 2.6) and consistent in sign and magnitude. The suggestive increase in attendance is driven by girls,

Figure 2.5: Children's School Attendance, Mediated by Mother's Initial Intrahousehold Bargaining Power

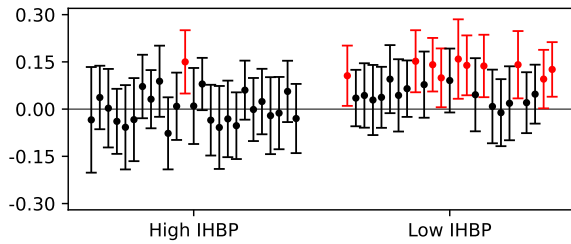


Note: Plots in this figure show results from Equation 2.2 which includes an interaction between treatment and the binary of a woman's intrahousehold bargaining power prior to treatment. Of all households in which the mother had a lower intrahousehold bargaining power in the control group with children aged 10 to 19, at least one child attended school last week in 73.5% of cases. Of all households in which the mother had a lower intrahousehold bargaining power in the control group with girls aged 10 to 19, at least one child attended school last week in 68.9% of cases. This fell to 46.1% for the girls in age group 15 to 19. Of all these households in the control group with boys aged 10 to 19, at least one child attended school last week in 74.5% of cases. This fell to 59.3% for the boys in age group 15 to 19. All regressions include controls for the relevant number of children in the household age group and the binary for historical violence in the municipality alongside standard errors clustered at the municipality-level.

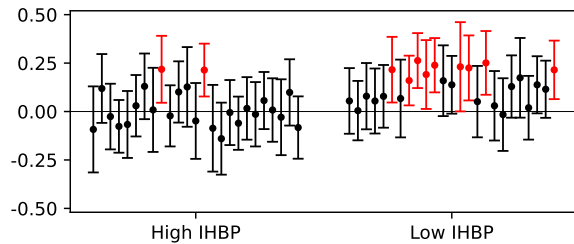
specifically by girls beyond mandatory schooling age in Colombia – precisely the age of girls most at risk of dropping out of the system and into early marriage or the informal/precarious labour market. Indeed, girls are particularly at risk of being set onto a vulnerable trajectory after being displaced in terms of higher risk of early marriage and entering into disempowered

Figure 2.6: Girls' School Attendance – Robustness

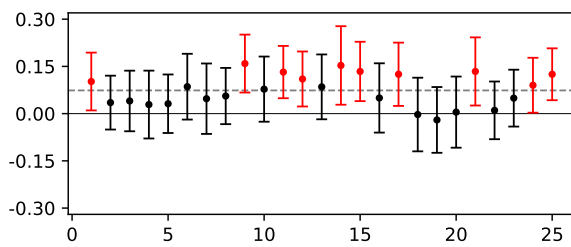
(a) Girls Aged 10–19 Years Old – Split by Mother's Bargaining Power



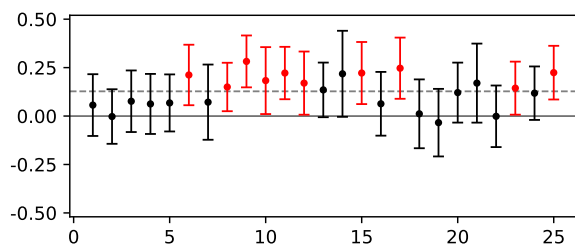
(b) Girls Aged 15–19 Years Old – Split by Mother's Bargaining Power



(c) Girls Aged 10–19 Years Old – Interacted with Bargaining 19



(d) Girls Aged 15–19 Years Old – Interacted with Bargaining 19



Note: Plots (a) and (b) show results from the split sample analysis by high and low bargaining power of the woman. This was achieved by running Equation 2.1 on each subsample. Plots (c) and (d) show the results of an interaction equation with the alternative definition of a woman's bargaining power – the binary equal to 1 if she gave birth by 19 years old, equal to 0 if she gave birth at an older age. Any woman who has not yet given birth is excluded from the sample. Of all households in which the mother had a lower intrahousehold bargaining power in the control group with women children aged 10 to 19, at least one child attended school last week in 74% of cases. This fell to 69% for women children aged 15 to 19. All regressions include controls for the relevant number of children in the household age group and the binary for historical violence in the municipality alongside standard errors clustered at the municipality-level.

relationships (Muñoz-Blanco, 2024).³² These results suggest formally writing mothers into property deeds may have the potential to enable girls and young women whose life has been shaken by forced displacement to accumulate more human capital than they otherwise would. Interestingly, there seem to be some negative effects on attendance of sons above mandatory schooling age in households where the mother has relatively low intrahousehold bargaining power. The robustness checks in Figure 2.7 corroborate that this negative effect on attendance only materialises among older sons in low bargaining power houses, although overall the 25 samples do not yield statistically significant point estimates.³³

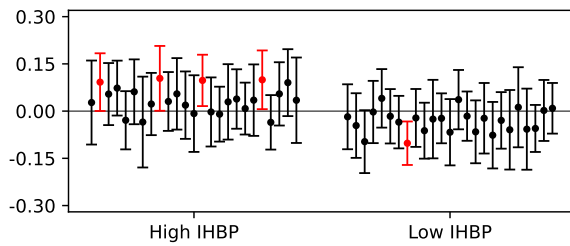
The effects of formal land ownership on women's labour supply in the full sample are not

³²The mean rate of school attendance of 10 to 19 year olds in areas of high historical violence is significantly lower than the mean attendance in low historical violence areas (70% of school aged children attend versus 80%). This suggests there may be particularly large scope for 'catch-up' in human capital accumulation of children in households living in areas worse affected by the conflict holding mothers' preferences over education constant. To investigate this, I interacting treatment with the historical level of violence. Results are shown in Figure 2.A.1 of the Appendix and suggest school attendance increasing significantly more when mothers obtain formal land ownership rights in areas which experienced high levels of historical violence.

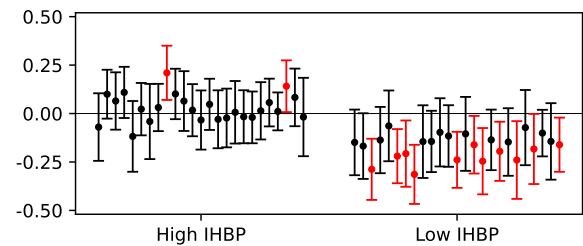
³³As can be seen in Figure 2.A.2 of the Appendix, this decrease in school attendance of the older cohort coincides with an increase in men's labour supply. So this particular age cohort of men seems to be substituting school attendance for work.

Figure 2.7: Boys' School Attendance – Robustness

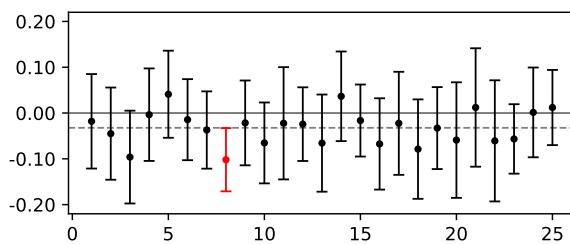
(a) Boys Aged 10–19 Years Old – Split by Women's Bargaining Power



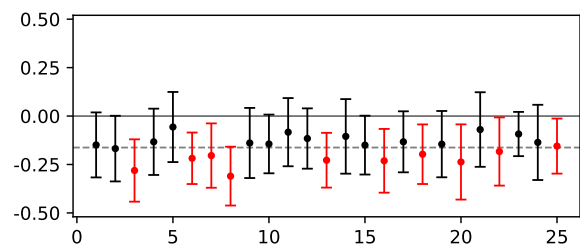
(b) Boys Aged 15–19 Years Old – Split by Women's Bargaining Power



(c) Boys Aged 10–19 Years Old – Interacted with Bargaining 19



(d) Boys Aged 15–19 Years Old – Interacted with Bargaining 19



Note: Plots (a) and (b) show results from the split sample analysis by high and low bargaining power of the woman. This was achieved by running Equation 2.1 on each subsample. Plots (c) and (d) show the results of an interaction equation with the alternative definition of a woman's bargaining power 'Bargaining 19' – the binary equal to 1 if she gave birth by 19 years old, equal to 0 if she gave birth at an older age. Any woman who has not yet given birth is excluded from the sample. Of all households in which the mother had a lower intrahousehold bargaining power in the control group with male children aged 10 to 19, at least one child attended school last week in 75% of cases. This fell to 59% for male children aged 15 to 19. All regressions include controls for the relevant number of children in the household age group and the binary for historical violence in the municipality alongside standard errors clustered at the municipality-level.

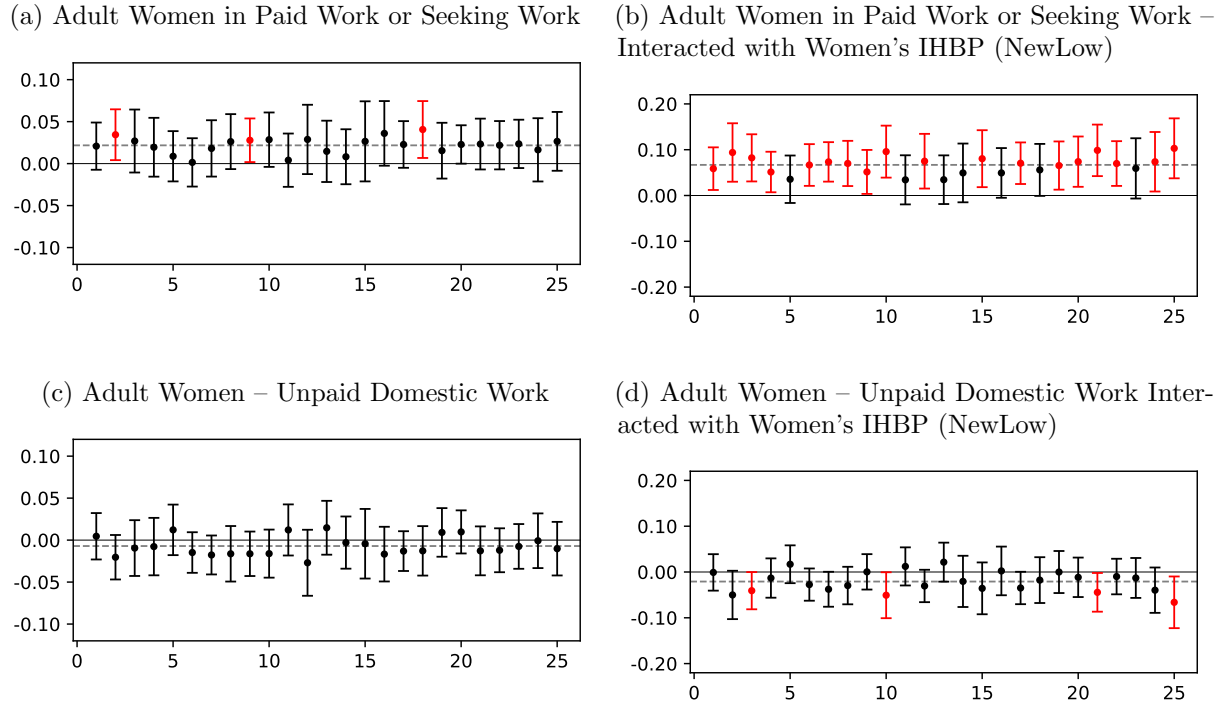
compelling, but some suggestive evidence of labour supply reallocation emerges when differentiating by initial bargaining power (Figure 2.8). This again suggests that providing formal land ownership to women with lower initial bargaining power may empower them to substitute towards income-generating work outside the home.³⁴ There are no impacts on the probability of unpaid care work.

The analysis of the mediating effect of initial intrahousehold bargaining power is particularly policy relevant in so far as it finds the strongest effects in households where the mother was relatively less empowered. Were the addition of a woman's name on the title deed voluntary – like it has been in many land reform programs – it is precisely these less empowered women who would never be titled. A policy which enables women to reallocate their labour supply towards income-generating endeavours could raise their intrahousehold bargaining power further over time thus, unlocking a self-reinforcing cycle of female empowerment.

It is possible that providing land formalisation to women who have been formerly displaced

³⁴The substitution comes from fewer adult women working on 'other activities', but no further specification was made of those activities in the census data. Figure 2.A.2 in the Appendix suggests that women's formalisation may also shift men's labour supply towards income-generating work.

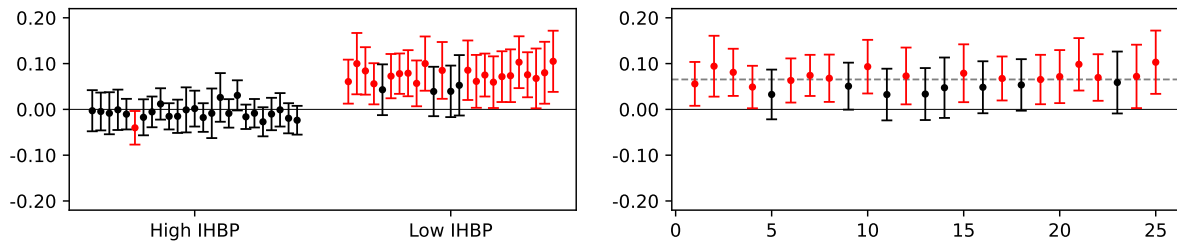
Figure 2.8: Women's Labour Supply



Note: Panels (a) and (c) show results from Equation 2.1 for women's labour supply. Almost 12% of adult women in the control reported their main activity last week was engaging in income-generating work or seeking work. The majority of women in the control (85.4%) reported unpaid care work as their main activity. Panels (b) and (d) show results from Equation 2.2 which includes an interaction between treatment and a woman's initial intrahousehold bargaining power. The control group for this model reported engaging in income generating work or seeking work in 10.8% of cases, and engaging in unpaid care work in 89.2% of cases. All regressions include controls for the relevant number of children in the household age group and the binary for historical violence in the municipality alongside standard errors clustered at the municipality-level.

Figure 2.9: Women's Labour Supply – Robustness

(a) Adult Women – Paid/Seeking, Split Sample by High IHBP (b) Adult Women – Paid/Seeking, Interacted with LowBarg19



Note: Plots (a) and (c) show results from the split sample analysis by high and low bargaining power of the woman. This was achieved by running Equation 2.1 on each subsample. Plots (b) and (d) show the results of an interaction equation with the alternative definition of a woman's bargaining power – the binary equal to 1 if she gave birth by 19 years old, equal to 0 if she gave birth at an older age. Any woman who has not yet given birth is excluded from the sample. Of all households in which the mother had a lower intrahousehold bargaining power in the control group women reported engaging in paid work in 10.8% of cases, and men reported doing so in 90.6% of cases. All regressions include controls for the relevant number of children in the household age group and the binary for historical violence in the municipality alongside standard errors clustered at the municipality-level.

by armed conflict is inconsequential to intrahousehold resource allocation. However, there are numerous alternatives which could obfuscate a true impact. Most research into the effect of providing formal land rights to women – on their relative position in a couple and in society at large – relies on the assumption that their new rights credibly improve their outside option. This higher outside option accrues to her from formal titling in the sense that if her marriage dissolves she retains a relatively higher financial standing relative to not being named on the title. However, this requires credible belief within her community that in the advent of a divorce she is entitled to – and will receive – equal division of the asset. This seems not to have been uniformly the case for women who have received land restitution in Colombia, although most evidence on the matter is qualitative.

García-Godos and Wiig (2015) examine Colombia's land restitution program implementation and find that patriarchal norms lead women to experience hostility, repression, and violence when attempting to change social, cultural, or religious gender norms around land ownership.³⁵ The risk of being attacked leads many women to avoid exercising their land rights (San Pedro, 2019). Robustelli (2018) found evidence that even when women wanted to push for their rights to be enforced, there was limited awareness of legislation that could assist them to do so. Finally, women in indigenous reserves who were disproportionately affected during the conflict, face particular hurdles in obtaining recognition of their rights from overlapping legal and customary tenure systems Isa (2014). All of this suggests that moving from a status quo in which women have *de jure* ownership rights over the land to meaningful *de facto* ownership may be a process that takes longer than the seven years of this study.³⁶ Moreover, some evidence regarding the implementation in Colombia has suggested that despite judges mandating joint titling, the registration office which is charged with formally registering the titles of restituted individuals makes errors in naming or specifying shares of ownership and therefore the titles remain incomplete (García-Godos and Wiig, 2018). Women need to actually be named on the formal title for empowerment to ensue.

In a bid to ensure any bias inserted into my control group would lead to lower bound estimates, I applied a highly conservative design. I imposed that my control group be composed of households in which women had been displaced by the armed conflict, returned to their land and reported owning their land.³⁷ The majority of IDPs generally do not own their land, making my control a subsample of IDPs that likely have some unobservables such as higher human capital, higher political capital, or higher economic capital.³⁸ Table 2.3 puts this into sharp relief, showing that wives were more educated than their spouses in 28% of the sample. The education gap between spouses in favour of women was far beyond the national average (of 18%). This suggests the

³⁵Only 11% of land reform beneficiaries between 1961 and 1999 were women, due to land reform policies reinforcing the 'male as breadwinner and rights bearer' model (Meertens, 2015).

³⁶Although the maximum number of years a households may have held formal land rights in this study is seven years, in actuality the bulk of land restitutions between 2011 and 2014 took place in 2013 and 2014, so most households would have had circa four years of treatment.

³⁷Despite the fact that most people who respond that they own their land in Latin America generally do not hold written titles to their land, a proportion of my control group likely did own the formal title to their land (FAO et al., 2019).

³⁸A 2010 nationwide survey on IDPs in Colombia found that only 18% of displaced farmers had formal property rights to their agricultural land (García-Godos and Wiig, 2015).

bargaining power of women in the sample prior to treatment may have been high enough for their preferences around human capital investments into their children to have been met prior to the treatment. That no effects are detected among the highest bargaining power women, whereas suggestive effects are found among the lower bargaining power women, seems to support this hypothesis. It seems possible that despite the efforts of policy implementers to reach less informed households, at least in the early years of the process displaced households with the highest human capital were navigating the restitution process and obtaining the land. If this is true we might expect that later waves of the policy provide formal land titles to women who have much lower intrahousehold bargaining power, which may lead to even more pronounced heterogeneity along that line.

Society places an uneven burden of care work on women. Often women complete domestic chores in addition to any work outside the home. As such, the wording of the demographic census – which only allowed one activity to be selected – may be providing a biased picture of women's activities. Measurement error in my dependent variable would not bias estimates, but insert variance such as to render results imprecise. If the demographic census allowed for multiple response options, more meaningful variation in women's time use upon receiving formal land ownership may have been detected. Moreover, the labour supply analysis would have provided a more comprehensive picture of work activities in rural Colombia if the questionnaire had differentiated between work on a household's own farm and work outside the farm. A central concern in the literature on land ownership relates to how households allocate their labour to balance work on their own land with income diversification through off-farm employment. These patterns of labour allocation are hypothesised to shift with access to formal ownership rights (Soto, 2000; Besley, 1995; Field, 2007). These could not be detected due to oversimplified response options in the 2018 Demographic Census.

2.5 Conclusion

Women's access to land has historically been restricted due to legal and cultural norms. Women – whether single or married – are far less likely to hold land titles than men, and this is particularly true in patriarchal societies such as Colombia. Land is a primary source of wealth creation and financial stability in agrarian societies, and ownership affords an array of opportunities. This is likely why land was a central contention in Colombia's armed conflict and led to 7.7 million internally displaced people. The rise in displacement due to conflict and climate disasters is shifting importance to the issue of how to reintegrate and retribute harmed parties. This paper has leveraged a land reform in a post-conflict Latin American context to examine the impact of formally naming women on land titles. Mid-term household investment decisions relating to human capital and labour supply have been analysed. This paper compared the outcomes of households in which married women had been internally displaced by Colombia's armed conflict and who returned to their land through the government's restitution policy, to control households in which the married women also suffered displacement during the armed conflict and also returned to land, and also report owning land, but did not receive formal written ownership rights through the government land restitution policy. These control and treatment groups were

obtained through a combination of nearest neighbour matching, propensity score matching, and exploiting the phased implementation borders of the land restitution policy. I leverage that the law mandates both women and men who were married at the time of displacement must be formally named on the title of the deed to explore heterogeneity by intrahousehold bargaining power. Theoretical and empirical literature show that only women with the highest bargaining power will be named on the deed in the advent of a voluntary joint titling policy. As such, any effect of the titling may be endogenous to her relatively higher intrahousehold bargaining power, and the results may not hold for less empowered women. In this paper I am able to look at heterogeneity of results specifically along this mediating variable.

This research finds no conclusive evidence that formalising land ownership of married formerly displaced women leads to a reallocation of household resources. I find indicative patterns of behaviour changes suggesting school attendance of girls above mandatory schooling age increases in households where the mother had lower intrahousehold bargaining power prior to restitution, and that adult women in these same households may be reallocating their labour supply towards income-generating work. There is no indication of any such effects among households of women with the highest initial intrahousehold bargaining power.

The population studied in this paper – IDPs – face several vulnerabilities at once. Forced displacement is linked with plethora of risk factors such as loss of human and physical capital as well as mental health challenges, all of which may trigger a downward trajectory. Young girls who have been displaced are particularly at risk of compounding vulnerabilities such as early marriage. As such, this suggestive evidence of a twin positive impact of human capital accumulation and labour supply shifts of households in household in which women had the lowest bargaining power, might be a roadmap to a self-reinforcing positive cycle for former IDPs and future generations. However, as results are statistically insignificant, these suggestions need further evaluation.

The lack of statistically significant results in this study may be related to the short time period. Formal land titling does not provide an immediate tangible change in the ability of a woman to make different choices, in the same way that providing her with an outside income which she can use and, to a certain degree, protect from capture by other household members (Bernhardt et al., 2019). Instead social norms within communities must update to reflect the expectation of a de facto change in women's outside option. This paper discussed the qualitative evidence which indicates that women in Colombia face many institutional and structural hurdles to enforce their land rights.

In order to assess whether providing formal land ownership to women in a post-conflict context truly has an empowering impact, additional data on implementation and outcomes is essential. Namely, the government may wish to collect data on numbers of women officially named on land titles upon restitution, and figures on how many of these women were awarded land or bought out of their land upon divorce. The latter information is pivotal in terms of gauging whether women's de facto outside option changed with formal land titling. It would also be important to gather information on the disaggregated bundle of rights women hold over the land in practice. Doss and

Meinzen-Dick (2020) propose a framework with which to analyse land tenure security for women and differentiate rights within the bundle as: *usus*, the right to use, including the rights of access and withdrawal; *abusus*, the right to change, including both management and transformational rights; *fructus*, the rights to make profit and loss; *exclusion*, right to prevent others from using a resource; *transfer*, right to transfer the land, whether temporarily or permanently; and *future interest*, the right to inherit or other rights that can be realised at a future date. It is important to distinguish between who controls these rights within a household if policy is pursuing women's land ownership as a means to open avenues to greater capabilities.

In terms of inter-generational improvements in women's land ownership, it will be important to maintain a record of the gendered inheritance patterns of land restituted to women and formally owned by mothers. As previously discussed incongruence exists between statutory and customary inheritance laws in Colombia. Although women can inherit, there is no requirement or enforcement, so son preference which prevails in patriarchal societies has led to sons inheriting property more often than daughters (Garcia, 2005). Inheritance is the primary way that women acquire property in Colombia García-Reyes and Wiig (2020), so women's sustained access to land rights across generations will be a key metric of women's empowerment.

To identify the mechanism behind changes, it would be useful for future policy-making to measure the involvement of women's advocacy groups in the national debate. Deere (2017) reviewed the four largest agrarian reforms of the 21st century in Latin America – in Bolivia, Ecuador, Brazil and Venezuela. Deere discusses the pivotal role women's rural groups played in bridging the gap between women's formal land rights and attaining them in practice, from making women aware they have rights, to giving them a voice in demanding their rights be enforced. This advocacy work was pivotal in pushing communities to update their social norm beliefs.

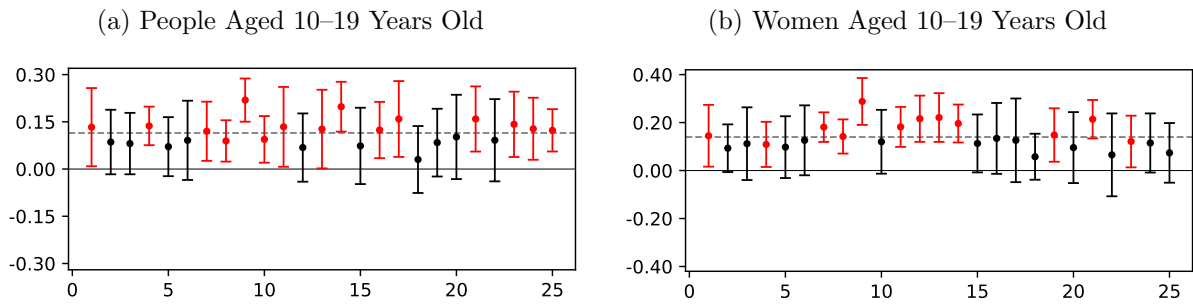
This paper has focused on the impact of women's land rights on their intrahousehold bargaining power. However, future research should consider displaced women who are not included in the restitution process. Indeed, restitution focused on people who could demonstrate their rights as owners or possessors of the land rather than occupiers of the land. Esquirol (2021) notes how this is more likely to exclude women because they are far less often listed on ownership documentation – women widowed during the armed conflict are a particularly vulnerable subsection. A report by Amnesty International (2014) detailed how the law requires the claimant to provide information such as who has lived on the land, who has rights over the land, alongside its precise size and geographic location. All of this information is often administered by the man in a relationship.³⁹ In the advent of divorce or separation women claimants will often struggle to provide this information. Moreover, the report also cites evidence that in cases where a woman has separated from a man and cannot evidence her autonomous claim to the land but can evidence her relationship to the male claimant at the time of displacement, restitution judges often only call on the man to give evidence. The role of the restitution judge is crucial to women's access to formal land rights, and as such further investigation into the details of that process could shed

³⁹Quisumbing and Kumar (2014) discuss how given the historical imbalance in land ownership, women are often less involved and therefore less informed about land and ownership rights, so even if they are jointly titled they may not be able to take advantage of their rights.

light on the extent to which only the most empowered women are able to obtain restitution, potentially leaving the most vulnerable women further marginalised from formal asset ownership relative to men than before.

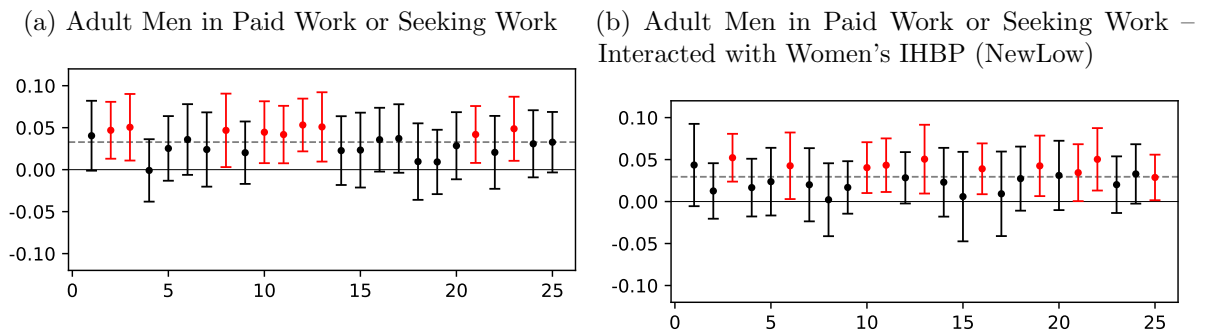
Appendix for Chapter 2

Figure 2.A.1: Children's School Attendance – Interacted with Historical Violence



Note: Plots are the result of an equation which includes an interaction between treatment and the binary of whether the municipality experienced high levels of violence during the height of the armed conflict. Of all households living in areas with high historical violence with children aged 10 to 19, at least one child attended school last week in 68.1% of cases. The rate specifically for households with women aged 10 to 19 was 64.9% which fell to 44.7% for women aged 15 to 19. The rate specifically for households with men aged 10 to 19 was 66.5% which fell to 47.3% for men aged 15 to 19. All regressions include controls for the relevant number of children in the household age group and the binary for historical violence in the municipality alongside standard errors clustered at the municipality-level.

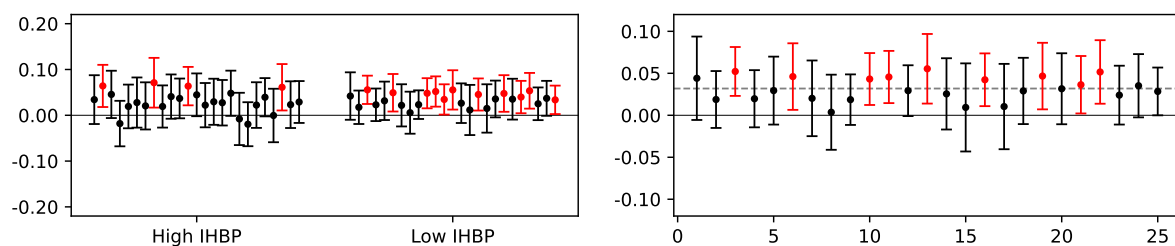
Figure 2.A.2: Men's Labour Supply



Note: Panel (a) shows results from Equation 2.1 for men's labour supply. Almost 83.6% of adult men in the control reported their main activity last week was engaging in income-generating work or seeking work. Panel (b) shows results from Equation 2.2. The control group mean among households in which the woman had low initial intrahousehold bargaining power was 90.7%. All regressions include controls for the relevant number of children in the household age group and the binary for historical violence in the municipality alongside standard errors clustered at the municipality-level.

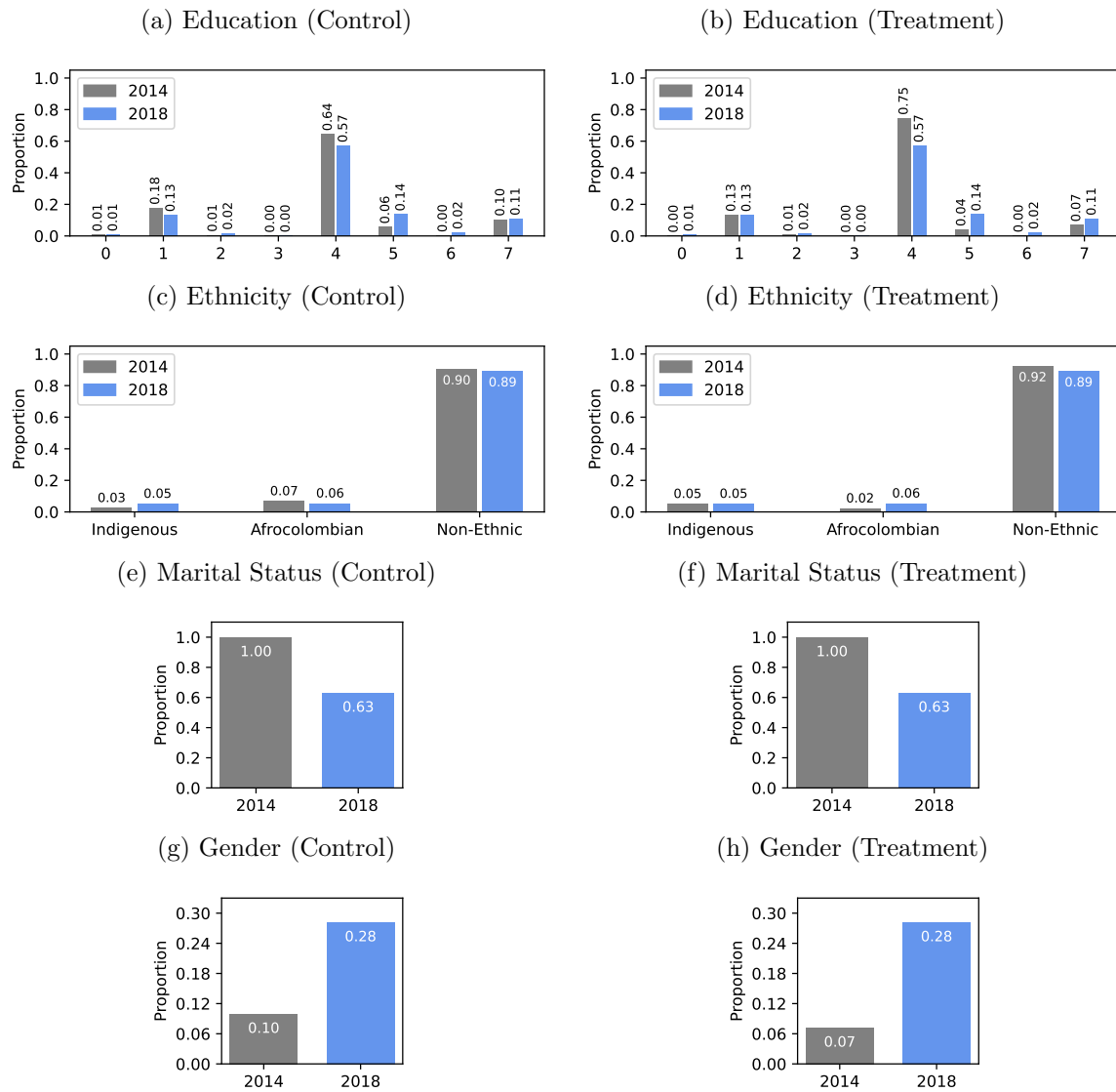
Figure 2.A.3: Men's Labour Supply – Robustness

(a) Adult Men – Paid/Seeking, Split Sample by (b) Adult Men – Paid/Seeking, Interacted with Low-NewLow Barg19



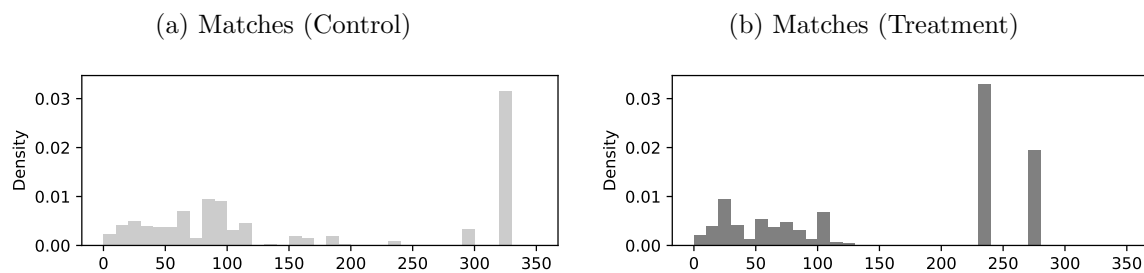
Note: Plots (a) and (c) show results from the split sample analysis by high and low bargaining power of the woman. This was achieved by running Equation 2.1 on each subsample. Plots (b) and (d) show the results of an interaction equation with the alternative definition of a woman's bargaining power - the binary equal to 1 if she gave birth by 19 years old, equal to 0 if she gave birth at an older age. Any woman who has not yet given birth is excluded from the sample. Of all households in which the mother had a lower intrahousehold bargaining power in the control group women reported engaging in paid work in 10.8% of cases, and men reported doing so in 90.6% of cases. All regressions include controls for the relevant number of children in the household age group and the binary for historical violence in the municipality alongside standard errors clustered at the municipality-level.

Figure 2.A.4: Pre-Matching Balance of Household Head in 2014 and 2018



Note: Education categories range from ‘no education’ (0) to ‘post-graduate education’ (7). The original Spanish definitions are: Ninguno, Basica Primaria, Basica Secundaria, Media, Técnico, Tecnológico, Universitario, and PostGrado.

Figure 2.A.5: Post-Matching Histogram of Number of 2018 Unique Matches



Chapter 3

Social Integration Following Land Restitution

Clarification of contributions. This chapter is based on a working paper co-authored with Dr Margaryta Klymak (King’s College London). As the lead author my contributions included the conceptualisation, sourcing and collection of data, dataset construction, methodology, formal analysis, and writing of the manuscript.

3.1 Introduction

A large body of economics literature has considered the fundamental role social cohesion plays in the prosperity of nations, both theoretically (Gradstein and Justman, 2002), and empirically across countries (Easterly et al., 2006; Pervaiz and Chaudhary, 2015) and within countries (Alesina and La Ferrara, 2000, 2002, 2005).

Literature in political science, economics, and conflict studies has explored the impact of conflict, victimization and displacement on social integration. Research has uncovered evidence that exposure to conflict can encourage pro-social behaviours such as involvement in community associations, public good contributions and displays of trust-based cooperation (Téllez and Balcells, 2024; Bauer et al., 2016; Blattman, 2009; Gilligan et al., 2011; Voors et al., 2012), or lead to tensions, lack of cooperation and punitive actions towards ‘out-groups’ (Rohner et al., 2013; Balcells, 2012; Vélez et al., 2016). A distinction between behaviour in ‘developed’ countries and ‘developing’ countries emerges from the empirical literature. Henrich et al. (2010) find evidence that western, educated, industrialised, rich, and democratic countries, which he terms WEIRD, exhibit greater pro-social behaviours in the wake of conflict. Schulz et al. (2019) reassert these findings. In contrast, Cecchi et al. (2016) reveal greater ‘in-group’ cooperation coupled with greater antagonism towards ‘out-groups’ through lab-in-the-field experiments in post-civil war Sierra Leone. The posited mechanism is that societies with tighter kinship ties shift trust towards their known community and become distrusting of strangers.

Additional mechanisms explored suggest that ‘anti-social’ reactions may relate to post-traumatic

stress disorder (PTSD) from experiences of victimisation. Vinck and Pham (2009) find that people who were formerly abducted by rebel groups in Uganda exhibited high rates of psychological trauma due to the acts they witnessed, were forced to commit and the prolonged exposure to violence. Landwehr and Ojeda (2021) show that depression significantly impedes political interest and internal efficacy. On the other hand, mechanisms behind ‘pro-social’ behaviours in the wake of conflict have been ascribed to resilience and ‘post-traumatic growth’ (Schon, 2020). Bateson (2012) analyses survey data across five continents and estimates that the effect of crime victimization equates to an additional five to ten years of education in terms of victims’ likelihood to engage in political participation.

Barr (2004) runs a set of social game experiments among resettled households in Zimbabwe. These households were part of a land reform program which sought to redistribute land from white commercial farmers to Black Zimbabweans who had been dispossessed during colonial rule. Barr finds evidence that resettled households exhibit lower trust in their community than the control group in which households share tighter kinship ties.

The literature exploring effects of displacement on victims and host communities in Colombia has largely focused on their experience whilst displaced (Ibáñez and Moya, 2008; Ibáñez and Vélez, 2008; Ibáñez and Moya, 2010b; Ibáñez et al., 2022), and overall finds negative reception among host communities. Morales (2018) documents how the arrival of IDPs constituted a large positive shock to the supply of low skilled labour in urban areas. This depressed informal wages for both IDPs and locals. These studies into the experience of IDPs post-displacement suggest receiving communities may feel that the arrival of IDPs is a zero-sum game in which they must compete over finite resources. Often studies examining the lived realities of internally displaced people will conduct surveys in which individuals are asked about their feelings relating to returning home (Vinck and Pham, 2009; Ibáñez and Vélez, 2008), but none have empirically assessed social integration after IDPs have actually returned home, and been restituted formal land rights.

This paper posits that land restitution could be a post-conflict policy which encourages social cohesion and integration of internally displaced people. Unlike the aforementioned literature, which delves into IDP outcomes and host communities whilst IDPs are displaced, formal land restitution provides ownership over a productive asset and return. I find evidence in the first chapter of this thesis that IDPs leverage this asset to build a stable livelihood for their families and contribute to the wider community. The first chapter reports that restituted IDPs households employ labour in their community, thereby generating jobs. It also provides evidence that former IDPs are producing to sell at local markets and commerces, another contribution to the community. For these reasons we might expect IDPs will be well received into communities after restitution as compared to findings from literature which only investigate social integration of IDPs during displacement. The economic boost that the policy of land restitution provides to the community could facilitate reintegration of IDPs – shifting mindsets away from a zero-sum game.

Another reason this chapter posits a favourable effect on pro-social behaviour also builds upon findings from Chapter 1 of this thesis. Land restitution significantly increases self-reported

quality of life among IDPs. Land is more than solely a productive asset, it likely holds a strong emotional connotation for people who have suffered forcible displacement from their home. The relative stability, alongside financial independence land provides could contribute to improved psychological wellbeing. As we know from the literature, depression rates are high among IDPs and depression correlates with low pro-social behaviours and political apathy. However, quality of life results suggest lower levels of depression among restituted IDPs such that we could see more pro-social behaviours exhibited.

The impact of land restitution on social cohesion is a research question with important public policy implications. Social cohesion fosters the environment for a sustainable peace, reducing the likelihood of future outbreaks of unrest between populations. This is particularly relevant in the case of civil unrest wherein factions of a nation were pitted against one another. In this paper we test whether the policy facilitates overcoming these hurdles.

This final chapter of the thesis uses a distinct identification strategy to the previous chapters – a spatial regression discontinuity design coupled with an instrumental variable approach. Given that there is no experimental data with which to identify a control group, this chapter tests another credible methodology to obtain causal estimation. We construct a novel geospatial dataset combining information on formal land restitution, Colombian vereda-level data,¹ and individual-level information on applications to the land restitution unit.² This dataset makes it possible to identify veredas that received land restitution. We then distinguish between treatment and control groups. Our treated group includes households displaced by the armed conflict, who have returned to land inside the eligible area and now own their land. Households in the control group were also dispossessed of their land by the armed conflict but are residing in veredas contiguous to the border of the eligible area. This spatial discontinuity supports our assumption that treatment and control households only differ in their probability of receiving land restitution rather than along any intrinsic unobservable characteristics. Only households inside the eligible area can receive restitution, those outside the border have a probability of zero.

We find evidence of successful social integration into the community – restituted households were on average 26% more likely to be members of an association, most often of a cooperative association or an association of producers. They were also more likely to be involved in reciprocal work with other members of their community. We note that all the measures of social integration are in some way advantageous to wealth creation. Membership of an association of producers or a cooperative unlocks access to a plethora of productivity enhancing inputs and fosters social ties within the community. Members tend to benefit from scale economies when purchasing inputs like fertiliser and seeds, as well as from higher bargaining power when setting prices for their produce. The social contact membership provides also increases knowledge sharing of agricultural best practices, as well as a level of risk-pooling. This aligns with the mechanism of land restitution providing IDPs with the means to contribute productive output to the community to which they return, thereby easing their reinsertion and welcome.

¹The vereda is the geographic administrative unit below the municipality. There are 1,103 municipalities in Colombia and 32,377 veredas. It is frequently a village comprising between 50 and 1200 inhabitants.

²The research design was informed by in-person interviews with the former and current directors of the land restitution unit, and from visits to rural households who have been restituted.

Our paper contributes to the post-conflict literature as the first causal analysis of social integration of former IDPs upon receiving land restitution. The closest work to this paper is that of Téllez and Balcells (2024). They examine the impacts of displacement on economic, psychological, and social outcomes, including cohesion and trust. However their work differs from the work in this thesis in several important ways. Whereas their paper considers the effects of displacement, this thesis considers the impact of returning to land with formal ownership rights. Whereas this chapter uses a combination of census and administrative data, their paper uses a survey of 1,500 rural households. This chapter uses methods to obtain causal estimates through a combination of spatial regression discontinuity design and instrumental variables, their paper simply controls for observables and uses inverse probability weighting – they claim no causality.

As the previous two chapters of this thesis detail Colombia’s armed conflict and the land restitution process, these are not repeated in this final chapter. The rest of this chapter is structured as follows. Section 3.2 presents the dataset, Section 3.3 discusses the empirical strategy, Section 3.4 presents the results and robustness checks, and Section 3.5 offers concluding remarks.

3.2 Data

To identify the impacts of land restitution on displaced households, we create a dataset combining information from multiple sources. Our first data source is the Colombian government’s Land Restitution Unit (URT) which collects all individual-level land restitution claims received between 2011 and 2021, including the outcome of the application. Using this information, we code the veredas in which claims were made before 2015 and whether any land was restituted. Second, we geolocalise all areas eligible for official restitution before 2015 and 2021, respectively. The combination of these two types of information allows us to identify all veredas that had received requests for land restitution by 2014. It also enables us to distinguish between veredas that had become eligible by 2015, and those that had not yet become eligible in 2014 but will become eligible by 2021. Third, we use the 2014 Agricultural Census restricting the sample to households which have suffered dispossession from their land through the armed conflict, and in which the person charged with making decisions for farm production was also living in a household on the land.³ Fourth, we match the census with our geolocalised data to information on the intensity of the armed conflict in Colombia, which is collected by the Conflict Analysis Resource Center.

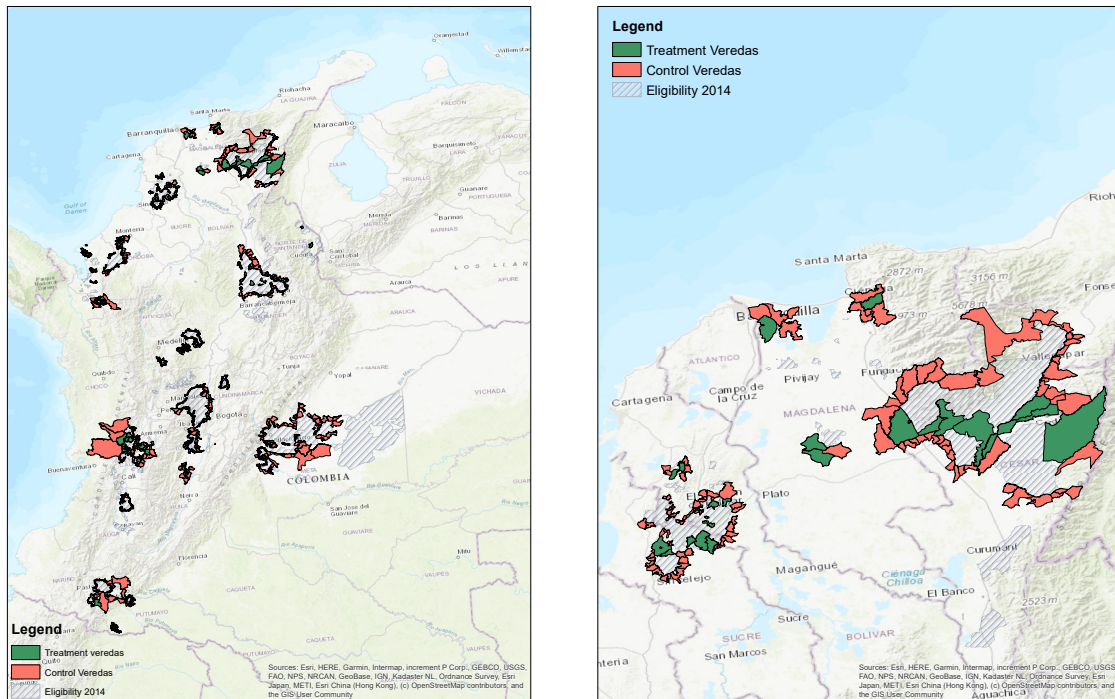
This combined final dataset enables us to create treatment and control groups. Our treatment area includes all eligible veredas, i.e. in which land had been deemed eligible for restitution claims to be processed, and where at least one confirmed land restitution took place by the end of 2014. Within these veredas, we then select as treated all households which were dispossessed of their land and have returned to formally own their land. This results in a final set of 113 treatment veredas and 2,207 households. We then create a counterfactual group meeting which satisfies two criteria. First, the control vereda is contiguous to the border of the eligibility area of the

³Due to the formulation of the census questionnaire it was only possible to identify land dispossession if the person charged with decision-making on the farm answered the household survey. Linked to this, to maintain the clearest causality we restricted the dataset to farms with one decision-making household which was previously or currently dispossessed, and is living on the land.

Figure 3.1: Treatment and Control Veredas

(a) Country-level

(b) Region-level



Note: This figure plots the location of treatment and control veredas. Panel (a) plots the information at the country level. Panel (b) presents this information for a selected region to provide a closer view. Source: Authors' calculation.

treatment vereda. Second, the control group only consists of households who were dispossessed of their land due to the armed conflict but have not yet returned. These two selection criteria result in 759 control veredas and 9,409 control households.

Figure 3.1 demonstrates the treatment and control veredas alongside the eligibility areas, at the (a) country-level and (b) region-level. The treatment veredas are represented in green, whilst control veredas are red. The eligibility area in 2014 is denoted using grey stripes. Three observations can be made from this figure. First, eligibility areas and subsequent treatment and control veredas are not concentrated in one part of the country but rather are spread across Colombia. Second, there is large heterogeneity in vereda size, i.e. neither large nor small veredas were prioritised. Third, the eligible areas do not follow municipality borders.

Table 3.1 describes the profiles of the treatment and control groups as well as the orthogonality tests at municipality, vereda, and individual levels. In the last column we run a joint test of orthogonality to test for balance in our treatment and control groups. This test checks that treatment does not predict a significant difference in our observable controls. We use two macroeconomic level variables collected prior to treatment: nightlight intensity – included as a proxy for income levels – and the level of violence during the height of the conflict. The results of the orthogonality test confirm that control veredas were not in better-performing areas and the level of violence cannot significantly predict treatment. We also control for density of

Table 3.1: Pretreatment Variables for Control and Treatment

VARIABLES	Control Mean	Control N	Treatment Mean	Treatment N	Difference	IV p-value
<i>Municipality level</i>						
Dispossession Rate	0.228	127	0.337	61	−0.109	0.084
High Level of Violence	0.898	127	0.738	61	0.16	0.169
Moderate Level of Violence	0.047	127	0.164	61	−0.117	0.122
Low Level of Violence	0.055	127	0.098	61	−0.043	0.169
<i>Vereda level</i>						
Nightlight 2012	0.20	665	0.07	125	0.13	0.142
<i>Individual Level</i>						
Year Dispossessed	2001.24	9281	2001.69	2196	−0.45	0.195
Education – None	0.37	8926	0.49	2131	−0.12	0.089
Education – Primary	0.20	8926	0.21	2131	−0.01	0.000
Education – Secondary	0.08	8926	0.05	2131	0.03	0.001
Education – Tertiary+	0.13	8926	0.07	2131	0.06	0.841

Note: This table presents summary statistics and balance checks for pretreatment variables at the municipality, vereda and individual levels.

dispossession in each vereda, that is to say how many people were dispossessed from their land by the conflict. It is particularly important to check that this is not differential between treatment and control groups given that dispossession was a determinant of the national security council's decision to make the area eligible for restitution. We find no significant difference, which lends support to our spatial regression discontinuity strategy identifying households that are similar except for one falling on one side of the border rather than the other. Adding assurance, we also find that there is no significant difference in the year households in treatment and control were displaced. The only significant difference between treatment and control pre-treatment is that household heads are slightly more educated, however we control for this in the analysis.

Table 3.2 provides summary statistics on an array of other variables we control for in the analysis. We find no significant differences in the ethnicity composition of treatment and control households, nor in the number of female-headed households: 23% in the control and 18% in the treatment. We find treatment and control households similar in terms of the size of their land, the material of their property walls and floors and the age of the household head. We do find that treatment veredas are slightly larger than control veredas, but we control for this in the analysis.

Table 3.2: Summary Statistics

VARIABLES	Control Mean	Control N	Treatment Mean	Treatment N	Difference	IV p-value
Minority Ethnicity	0.16	9409	0.05	2207	0.11	0.065
Female Household Head	0.23	9409	0.18	2207	0.05	0.557
Household Size	3.55	9409	3.55	2207	0.00	0.090
Age of Household Head	48.67	9409	51.66	2207	−2.99	0.111
Log Land Size	10.17	9409	11.00	2207	−0.83	0.620
Log Vereda Size	8.01	9409	8.34	2207	−0.33	0.026
Floor material – Type 1	0.5	9314	0.45	2188	0.05	0.025
Floor material – Type 2	0.3	9314	0.37	2188	−0.08	0.014
Floor material – Type 3	0.13	9314	0.11	2188	0.02	0.274
Floor material – Type 4	0.08	9314	0.07	2188	0.01	0.274
Wall material – Type 1	0.44	9323	0.39	2187	0.05	0.463
Wall material – Type 2	0.17	9323	0.31	2187	−0.14	0.096
Wall material – Type 3	0.33	9323	0.25	2187	0.08	0.496
Wall material – Type 4	0.06	9323	0.05	2187	0.01	0.024

Note: This table presents summary statistics and balance checks at the individual levels. Floor material type (1) refers to cement; type (2) refers to earth; type (3) refers to wood; type (4) refers to ‘other’ which includes carpet, marble, parquet, polished or lacquered wood, tile, vinyl, tablet, brick and ceramic. The reference category in balance checks for cement, floor, earth and wood variables is floor material other. Whilst the baseline category for floor material other is floor material is wood. Walls material type (1) includes block, brick, stone, polished wood; type (2) includes tapia tread and adobe; type (3) includes rough wood, board, and plank; the other type includes prefabricated material, cane, mat, other vegetables, zinc, tile, cardboard, cans, waste, plastics and no walls; type (4) other. The reference category in balance checks for wall material variables is wall material other. The baseline category for wall material other variable is wall material (3).

3.3 Empirical Strategy

To evaluate the impact of land restitution on households who were formerly displaced by the internal armed conflict, we estimate the following empirical model:

$$y_{hvm} = \beta_0 + \beta_1 \text{Restitution}_{hvm} + \Psi' X_{hvm} + f(Z_m, Y_m) + \epsilon_m \quad (3.1)$$

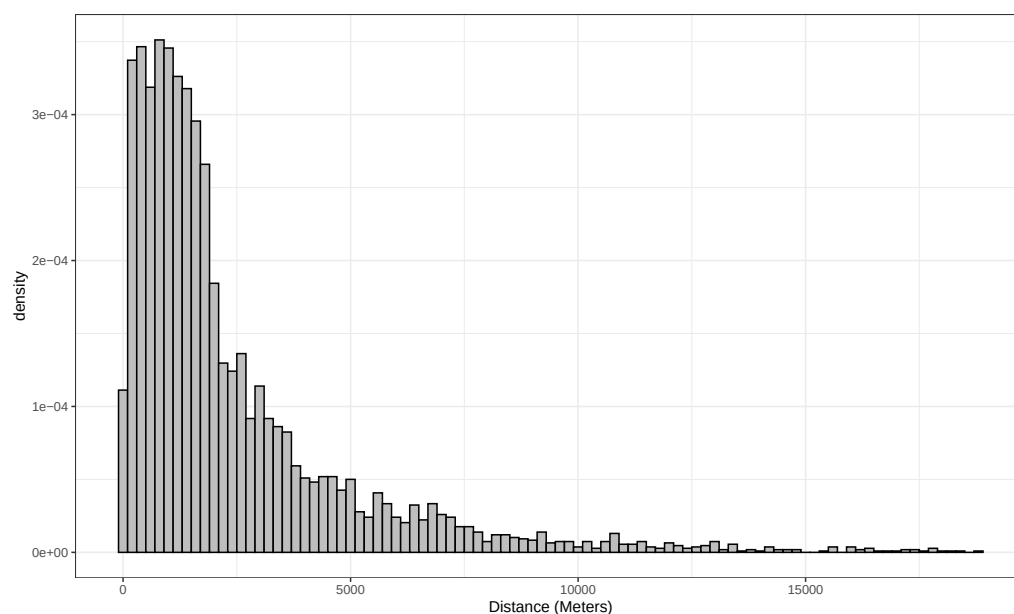
Where y denotes the outcome of a household h living in vereda v located in municipality m . *Restitution* captures whether a household is treated. X is a vector of household-level characteristics that include the ethnicity, level of education and gender of the household head as well as the household size, year evicted and size of farm. $f(Z_m, Y_m)$ is a polynomial of geographic location, where the longitude and latitude of the municipality control for confounders which are continuously distributed along the border, e.g., rainfall, soil characteristics. We cluster standard errors at the vereda level since households in each vereda are likely to be affected by similar shocks than households in different veredas. As a robustness check, we also use Conley (1999) standard errors to account for spatial correlation in the data.

Equation 3.1 needs to satisfy several criteria to be internally valid and provide unbiased, causal impact estimates. First, all controls must vary smoothly around the boundary. Second, only the treatment must exhibit a ‘discontinuity at the cut point’ (Hahn et al., 2001). Third, the ‘local randomisation assumption’ must hold (Lee and Card, 2008). This in turn requires that a person does not have control over whether their land falls on one side of the boundary or another, making the difference in unobservables for people close to the border random. Given that being in an eligible area is a pre-requisite for restitution and that assignment to an eligible area is based on a strict longitude and latitude, i.e. the location of the border, the eligibility border is the rule which predicts treatment. If there can be no selective sorting across the border, any difference in subsequent mean outcomes should be caused by restitution. It is unlikely that any given household can influence the National Security Council in determining the border, nor should any local politician, given this is a federal-level determination. As the land itself cannot move, and as the URT is very thorough in triangulating information about the location of people’s land, there is limited scope for internally displaced people to manipulate the threshold, and thus for the boundary to be endogenously placed.

We perform an altered form of the McCrary test in Figure 3.2 to test for manipulation along the border by plotting the distance of restituted land to the border of the eligibility area. The density plot suggests there is no bunching exactly at the border but instead most of the restitution happened within 2.5 km of the border. Moreover, to show that there is incomplete information about the time at which an area will be rendered eligible for land restitution, Figure 3.3 demonstrates that by 2015 the URT had received substantial applications for land in areas that were not yet eligible.

The bandwidth, which is the interval around the cut-off, should be as small as possible given the sample. A smaller bandwidth lessens the bias from misspecifying the functional form of the relationship between the running variable and the outcomes, but comes at the expense of variance

Figure 3.2: Alternate McCrary Test

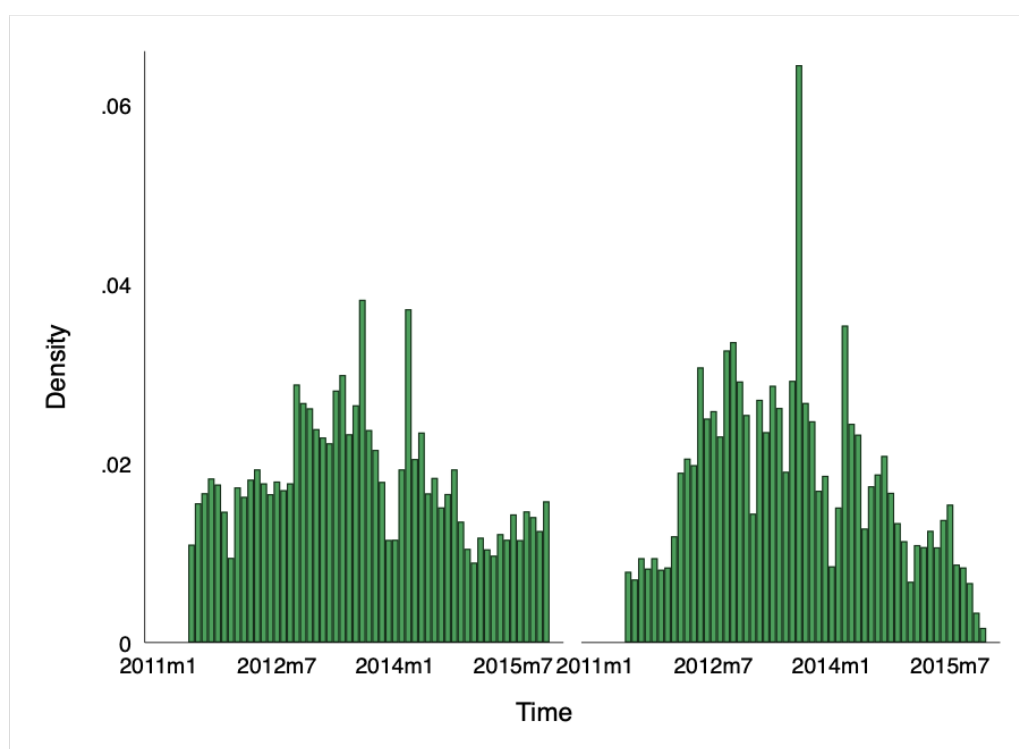


Note: This figure plots the distance of restituted land to the border of the nearest eligibility border.

Figure 3.3: Applications over Time by Eligibility

(a) Not yet eligible

(b) Eligible



Note: This figure plots the density of applications received by the URT between 2011 and 2015. Panel (a) plots the series for applications of victims not yet eligible for restitution. Panel (b) plots the series of victims eligible for restitution. Source: Authors' calculation.

required for precise estimation. If the choice of location is determined with even partial knowledge of the outcomes, then larger bandwidths introduce bias. If someone was astute enough to dupe the URT officials into believing their land was on one side of the boundary rather than the other, or if they were able to influence the decision of where to draw the border, i.e. through exerting social capital or another form of capital, it might be reasonable to assume that these traits would also influence whether they engage in land investments or access credit. Since treatment is at the vereda-level, rather than specific to each plot of restituted land, it is ‘lumpy’ and does not lend itself to the typical optimal bandwidth analysis. However, by selecting as control veredas only those who are contiguous with the border we restrict ourselves to plausibly the most comparable sample. The analysis does not suffer from the usual trade-off between optimal bandwidth and sample size.⁴ The local unconfoundedness claim for our estimates, therefore, appears credible.

Finally, we use an instrumental variable to address non-compliance within veredas, estimated using a two-stage least squares procedure that instruments restitution with being in an area eligible for restitution. The chosen instrument should be valid because it satisfies the assumptions of independence, exclusion restriction, first stage and monotonicity. Conditional on covariates, the land being sought by people is random along the border – people are unable to manipulate the location of their land or the border. The instrument operates through a single known channel – being in an eligible area affects the outcomes in no other way than through increasing a household’s probability of being restituted. Being in the eligible area should positively alter the likelihood that a household will be restituted. Under these assumptions, the instrumental variable estimation will provide the local average treatment effect on the compliant population. Compliers are the people who would not have been restituted land had they not been in the eligible area. When measuring the effect of restitution we encounter one-sided non-compliance – no household in the control who has returned and owns their land can be considered restituted given that they are outside the eligible area, thus there are no ‘always takers’.

There are several limitations to our approach. Our estimates are not representative of average treatment effects for three reasons: self-selection, lack of unconditional unconfoundedness, and heterogeneous effects. There are a large number of administrative hoops and proofs required to complete the lengthy process, in addition to the extensive in-person and secondary research URT officials undertake to validate each claim. Thus the estimates found in this research may be an upper bound if we believe the treated may have started in a more privileged position, as proxied by their ability to overcome all the administrative hurdles. Moreover, although the URT has undertaken outreach efforts, it is likely that people who are better informed and have better social networks had greater ability and confidence to file a claim. Furthermore, the effects of treatment are unlikely to be homogenous. Although we condition on observables at our disposal as a way of mitigating potential endogeneity driven by omitted variables, treatment may still depend on the unobservables discussed above, so we use an regression discontinuity design to achieve unconfoundedness for the subpopulation around the cut-off

⁴Note as we do not have information on the exact location of the farm, we are unable to control for distance from the farm to the border. As all veredas are contiguous, the distance from each vereda to the border is in principle zero. However, when we control for the distance from the centre of the vereda to the border, our results remain robust.

3.4 Results

This section first presents a series of regression results pertaining to whether restituted households have received auxiliary inputs of the land restitution package, namely support in accessing agricultural credit and training in agricultural best practices. Second, we discuss the impact of the land restitution policy on social integration of IDPs into communities.

3.4.1 Auxiliary Inputs

Table 3.3 presents results which pertain to applications for agricultural credit (Panel A) and technical assistance (Panel B). For each of these, we show results for four outcome variables and two specifications – odd columns excluding controls and even columns including controls. Our preferred specification includes control variables and corresponds to Equation 3.1. For each model we provide the first stage result as well as the mean, sample size and first-stage F-statistics. The first stage is highly predictive for all outcomes thereby providing reassurances that our instrument fulfils the relevance assumption.

Panel A of Table 3.3 indicates that restituted households are 13% more likely to apply for agricultural credit, although this result loses significance when controls are added to the model specification. Contingent on having applied for credit, the household is 12% more likely to be granted credit, but again only significant without controls. Delving into the organisation granting credit, restituted households are no more likely to be approved by Banco Agrario than by other banks. Banco Agrario was the bank selected to work with the government to disburse agricultural credit support to the victims of the conflict and specifically to beneficiaries of the land restitution program. The lack of statistically significant results for Banco Agrario is in line with the same test of auxiliary inputs run in Chapter 1 of this thesis, as well as the literature detailing the speed with which the credit component of the Ley de Las Víctimas was disbursed in Colombia's (García-Godos and Wiig, 2015). Panel A suggests that, at least in the short-run, land restitution is chiefly constituted of formal rights over restituted land such that effects are not meaningfully driven by auxiliary inputs.

Panel B of Table 3.3 presents the results for receipt of various forms of assistance over the past year. Restituted households are 9% more likely to receive assistance. Delving into the kind of assistance received, restituted households are 10% more likely to receive support in good agricultural practices.

We remove the polynomial of latitude and longitude in the Appendix (Table 3.5) to check whether our previous results occurred due to forcing a functional form. This marginally improves the robust F-statistic, reduces standard errors, and crucially all the results maintain their significance, signs and magnitudes. Our results are also robust to the use of Conley (1999) standard errors which allow for spatial dependence of an unknown form, as can be seen in the Appendix.⁵

⁵We do not control for the auxiliary inputs in this model because we seek to measure the effects of the restitution package. Social integration is an outcome which involves both the community and the individual household, therefore it is apposite to capture the array of inputs provided in the process.

Table 3.3: Auxiliary Inputs (polynomial)

PANEL A: CREDIT	Applied for a credit		Credit approved		Approved by Banco Agrario		Approved by other bank	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Restituted	0.125*** (0.0379)	0.0307 (0.0412)	0.117*** (0.0346)	0.0297 (0.0392)	0.0762 (0.0624)	0.0156 (0.0500)	-0.0320 (0.0590)	-0.0185 (0.0411)
Mean Dep Var	0.191	0.194	0.165	0.167	0.680	0.684	0.250	0.246
N	9942	9353	9942	9353	1636	1562	1636	1562
N Clusters	769	757	769	757	384	371	384	371
FS F-statistic	90.39	80.30	90.39	80.30	60.03	57.95	60.03	57.95
Controls	No	Yes	No	Yes	No	Yes	No	Yes
FIRST-STAGE RESULTS: Eligible	0.649*** (0.0683)	0.534*** (0.0596)	0.649*** (0.0683)	0.534*** (0.0596)	0.716*** (0.0924)	0.623*** (0.0819)	0.716*** (0.0924)	0.623*** (0.0819)
PANEL B: ASSISTANCE	Assistance		Assistance: GD practice		Assistance: soil management		Assistance: commercialization	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Restituted	0.156*** (0.0514)	0.0848* (0.0455)	0.159*** (0.0488)	0.0950** (0.0476)	0.0190* (0.00975)	-0.0134 (0.0124)	0.0180 (0.0309)	0.0445 (0.0275)
Mean Dep Var	0.271	0.277	0.202	0.206	0.0282	0.0290	0.0729	0.0739
N	9942	9353	11616	10922	11616	10922	11616	10922
N Clusters	769	757	790	776	790	776	790	776
FS F-statistic	90.39	80.30	66.85	70.01	66.85	70.01	66.85	70.01
Controls	No	Yes	No	Yes	No	Yes	No	Yes
FIRST-STAGE RESULTS: Eligible	0.649*** (0.0683)	0.534*** (0.0596)	0.578*** (0.0707)	0.479*** (0.0573)	0.578*** (0.0707)	0.479*** (0.0573)	0.578*** (0.0707)	0.479*** (0.0573)

Note: standard errors adjusted for clustering by municipality, are in parentheses. Coefficients that are significantly different from zero are denoted by the following system: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. First stage presents the coefficient for micro-focalisation in the reduced form regression for each model. All other coefficients refer to the second stage results of each model and sample specification.

3.4.2 Main Results

Table 3.4 presents the main results of the impact of land restitution on social integration. We measure social integration through membership of associations within the community such as associations of producers and farming cooperatives. We also measure whether a household partakes in reciprocal work. This is defined as agricultural work carried out on the land by members of the community with the understanding of reciprocal support rather than contingent on immediate financial remuneration. The variable ‘Any Association’ from Table 3.4 takes a value of one if the household head is a member of any local association and zero otherwise. In subsequent columns, we investigate whether the effect varies by type of association. Even columns include control variables while odd columns do not. The first-stage for all outcomes is highly predictive at the 1% significance level, and this is true across all three specifications.⁶

As hypothesised, land restitution significantly increases measures of social integration related to economic participation in the local community. We find that households who have been restituted land are 26 percentage points more likely to be a member of an association within their community. This is a sizeable effect given that 25% of households in the control belonged to an association. In particular, restituted households are 10 percentage points more likely to be a member of the association of producers and 14 percentage points more likely to be members of the cooperative association. Existing literature demonstrates that cooperative members benefit from informational advantages, reducing transaction costs and enhancing credit accessibility for farmers, thereby unlocking investment and paving the way for higher productivity and income. Jiang et al. (2024) finds that cooperatives reduce the transaction cost farmer face when seeking credit by sharing information about the farmers with credit institutions, and in so doing act as a type of guarantor for farmers by virtue of providing the information. This greater access to credit may ease the path to agricultural modernisation. Another benefit of belonging to a cooperative is that it allows members to pool resources and benefit from scale economies afforded to bulk purchases of seeds, fertilisers and other necessary agricultural inputs. Similarly, speaking in unison affords members greater bargaining power to negotiate preferential prices when selling their produce. By pooling resources to finance and manage the set up of processes for transportation, storage and distribution cooperatives and associations of producers can facilitate access to larger markets (Laursen et al., 2008).

Moreover, cooperatives and associations of producers are places where knowledge is shared, and latest best practices discussed. These incubators of collaboration pave the way to building the skills to practice modern farming techniques (Sánchez-Navarro et al., 2024). This could be particularly impactful for former IDPs who may be farming a new crop, distinct from the one grown during displacement. Cooperatives may also act as a risk-pooling safety net for farmers in times of difficulty (Chhinh et al., 2023). These resilience structures are precisely the sort IDPs lost through displacement. Altogether, cooperatives can serve as a platform for social interaction which strengthens prosocial ties further. Once the hurdle of joining an association of producers or

⁶The robust F-statistic for the first stage is consistently high and far exceeds the Stock and Yogo critical values for IV size and bias. Given that the Stock and Yogo critical values require errors to be independent and identically distributed, we additionally run the Montiel Olea-Pflueger (MOP) test for exactly identified instrumental variable analysis and find consistently high effective F-statistics.

a cooperative is cleared, the support and access to social networks IDPs can receive may become a self-fulfilling cycle which reinforces over time, cementing social cohesion further.⁷

Table 3.4 also reveals that restituted households are six percentage points more likely to be involved in reciprocal work - a result significant at the 1% level. Reciprocal work represents an increase of two thirds from the control group mean. This involves inviting community members to work on their land and former IDPs themselves providing physical labour reciprocally to their community without monetary exchange. Reciprocal work exemplifies trust both on the part of the IDP and on the part of participating community members.⁸ It is yet another marker that IDPs are integrating into the networks of their community and building up social capital - an essential attribute that was lost during their displacement (Torres and Casey, 2017; Dorff, 2017).

Table 3.5 examines the effect of land restitution on households' integration using spatial standard errors (Conley, 1999). Overall, all results remain robust. A potential concern with the results presented so far is that they could be driven by outliers. Therefore, we undertake a jackknife test to test for sensitivity. We perform this in three steps. First, we replicate specification 1 for each outcome. Second, we remove one of the 188 municipalities before reproducing our results for every variable. We then save the *Restituted* coefficient and repeat the procedure for each municipality in turn. Third, we plot the results of this exercise in Figure 3.4. All findings remain robust and are centered around the coefficients we found in Table 3.4.

Table 3.A.1 shows the effect of land restitution using an alternative control group. To obtain it we mapped out all veredas which had received land restitution applications by 2014. We then identified those which only obtain land restitution after 2014 due to not yet being in an eligible area by 2014. Using Euclidian distance, we select as controls the closest veredas that fulfil these criteria that are closest to each treatment vereda. This selection of the control group closely approaches the Rubin Causal Model ideal of simultaneously seeing outcomes of the same individual treated and untreated since the veredas are not treated in 2014 but will be in future. These two selection criteria result in 114 control veredas. Whilst the sign for most coefficients remains the same, this approach significantly reduces our sample size to about 4,900 observations and some coefficients are less precisely estimated.

As a final check, we explore whether results differ depending on the intensity of treatment within a given vereda – that is to say depending on how many households received land restitution. Table 3.6 presents the main results on a sample restricted to treatment veredas which have above median number of restitution cases.⁹ As we might expect the effects of land restitution are most pronounced in veredas that have a higher proportion of restituted households. Among households in veredas with above the median number of restitution cases we see that all results hold - these households are 18 percentage points more likely to be a member of an association, 10 percentage points more likely to be a member of a cooperative and 8 percentage points more likely to be a

⁷Akinola et al. (2023) and Ahado et al. (2021) found evidence that these multi-faced benefits to smallholder farmers adherence to cooperatives was associated with increased yields.

⁸Although it would be very informative to look at the heterogeneity of outcomes by the gender of the household head, there is an insufficient sample size in the female-headed restituted sample.

⁹There are 59 veredas with below median restitution cases, and 54 above. The median number of restituted households is 11, with largest number of restitution in a given vereda resting at 238.

member of an association of producers. These households are also seven percentage points more likely to participate in reciprocal work.

Table 3.4: The Effect of Land Restitution on Social Integration (polynomial)

PANEL A	Association		Association: cooperative		Association of producers		Collective work	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Restituted	0.271*** (0.0724)	0.259*** (0.0652)	0.143** (0.0628)	0.143*** (0.0486)	0.0984** (0.0399)	0.0991*** (0.0332)	0.0396 (0.0406)	0.0613** (0.0300)
Mean Dep Var	0.333	0.335	0.0774	0.0781	0.0946	0.0952	0.0841	0.0849
N	8716	8230	11616	10922	11616	10922	9908	9319
N Clusters	182	182	188	187	188	187	186	185
F-statistic	75.38	71.70	57.21	59.01	57.21	59.01	78.26	74.30
Controls	No	Yes	No	Yes	No	Yes	No	Yes
FIRST-STAGE RESULTS: Eligible	0.654*** (0.0753)	0.650*** (0.0767)	0.578*** (0.0764)	0.577*** (0.0751)	0.578*** (0.0764)	0.577*** (0.0751)	0.652*** (0.0737)	0.645*** (0.0749)

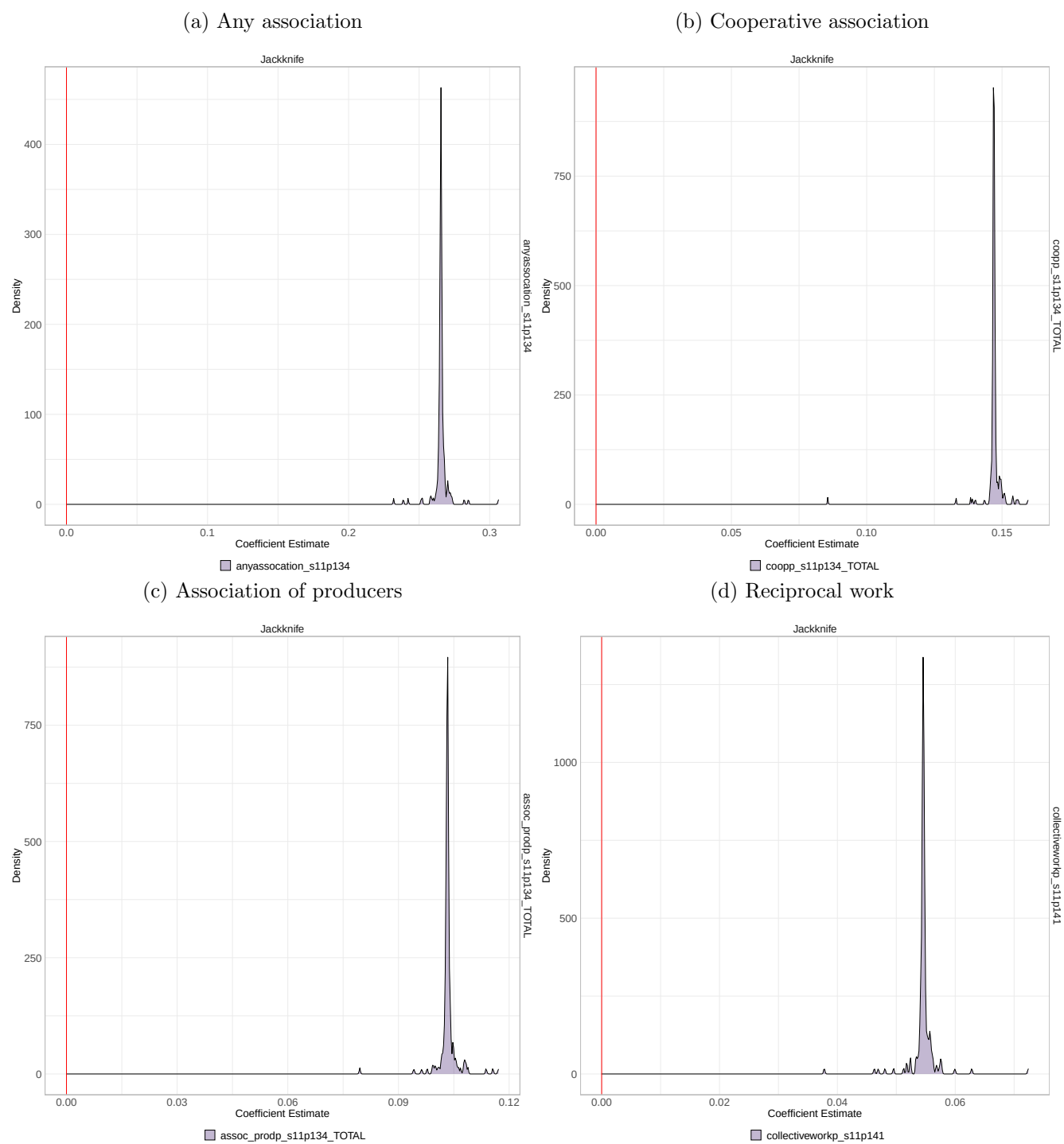
Note: Standard errors adjusted for clustering by municipality, are in parentheses. Coefficients that are significantly different from zero are denoted by the following system: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. First stage presents the coefficient for micro-focalisation in the reduced form regression for each model. All other coefficients refer to the second stage results of each model and sample specification.

Table 3.5: The Effect of Land Restitution on Social Integration with Spatial Errors (polynomial)

PANEL A	Association		Association: cooperative		Association of producers		Collective Work	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Restituted	0.271*** (0.0727)	0.259*** (0.0579)	0.143*** (0.0519)	0.143*** (0.0369)	0.0983** (0.0430)	0.0991*** (0.0367)	0.0395 (0.0356)	0.0617** (0.0295)
Mean Dep Var	0.333	0.333	0.0774	0.0774	0.0946	0.0946	0.0841	0.0841
N	8713	8230	11612	10922	11612	10922	9904	9319
F-statistic	64.10	61.75	51.99	51.95	51.99	51.95	67.26	64.35
Controls	No	Yes	No	Yes	No	Yes	No	Yes

Note: We use spatially adjusted standard errors (with 10km radius). These are presented in parentheses. Coefficients that are significantly different from zero are denoted by the following system: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. First stage presents the coefficient for micro-focalisation in the reduced form regression for each model. All other coefficients refer to the second stage results of each model and sample specification.

Figure 3.4: Jackknife Results



Note: The figure presents the outcomes of Jackknife tests performed for each social integration outcome.

Table 3.6: The Effect of Land Restitution on Social Integration above Median Number of Restitutions (polynomial)

PANEL A	Association		Association: cooperative		Association of producers		Reciprocal work	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Restituted	0.161*** (0.0496)	0.176*** (0.0404)	0.0927*** (0.0320)	0.102*** (0.0250)	0.0650** (0.0274)	0.0746*** (0.0222)	0.0337 (0.0351)	0.0379** (0.0162)
Mean Dep Var	0.230	0.232	0.0693	0.0702	0.0876	0.0881	0.0835	0.0839
N	9577	9008	9577	9008	9577	9008	8148	7672
N Clusters	650	638	650	638	650	638	631	621
FS F-statistic	95.62	292.6	95.62	292.6	95.62	292.6	1013.9	1371.3
Controls	No	Yes	No	Yes	No	Yes	No	Yes
FIRST-STAGE RESULTS: Eligible	0.779*** (0.0797)	0.803*** (0.0469)	0.779*** (0.0797)	0.803*** (0.0469)	0.779*** (0.0797)	0.803*** (0.0469)	0.900*** (0.0283)	0.897*** (0.0242)

Note: Standard errors adjusted for clustering by municipality, are in parentheses. Coefficients that are significantly different from zero are denoted by the following system: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. First stage presents the coefficient for micro-focalisation in the reduced form regression for each model. All other coefficients refer to the second stage results of each model and sample specification. Full regression output is available upon request.

3.5 Conclusion

In this paper we have explored whether a policy of land restitution supports formerly displaced households to rebuild social networks and social capital. Using a spatial regression discontinuity approach we found evidence that even in the short-run, markers of social integration were already significantly higher among restituted households. They are 26 percentage points more likely to be a member of an association, chiefly driven by a 10 percentage points increase and 14 percentage points increase in adherence to a local association of producers and local cooperative associations, respectively. These associations provide multi-faceted support to former IDPs. Members benefit from scale economies on the purchase of inputs and from higher bargaining power when setting prices to sell their produce. These organisations can also unlock access to larger, more distant markets by setting up distribution operations through their increased social networks and pooled resources. Moreover, these organisations are central nodes for strengthening social ties with other community members and building risk-sharing networks. Information about the local markets and knowledge about new agricultural technologies are also often shared in these forums.

Results also show an six percentage points increase in reciprocal farm work among restituted households - an increase of almost two-thirds from the control mean. This metric exemplifies mutual trust and cooperation. Reciprocal work requires the restituted household to trust that the community members coming onto their land do not pose an expropriation threat. In parallel, it requires that community members trust the restituted household will reciprocate the labour supply, despite no official binding contract or exchange of money having taken place.

Previous literature delving into the social integration of internally displaced people has been inconclusive. Literature on displacement finds that a key factor in the negative reception of IDPs among host communities relates to a perception that they are a drain on the local economy. Morales (2018) finds evidence that the arrival of Colombian IDPs in urban areas constituted a large shock to the supply of low-skilled labour, which exerted downwards pressure on informal wages. Host communities perceive that IDPs were both displacing people from their jobs and depressing their wages.

This research posits that the key distinction between previous literature and these findings is that land restitution provides a productive asset. It enables IDPs to contribute to the economic dynamism of the local area through generating employment and selling their produce to the local market. Indeed the first chapter of this thesis reports statistically significant evidence of this. Restituted IDPs were five percentage points more likely to permanently hire labour from the community at the extensive margin, and four percentage more like to substitute household labour for permanent hired community labour. These represent an 18% and 19% increase from control group means in the extensive and intensive margins of labour respectively. Chapter 1 also found evidence that female-headed agricultural households in particular were significantly more likely to sell their produce at local markets and to local commercial outlets. Together this may contribute to altering any zero-sum game mindset that host communities may hold surrounding the arrival of former IDPs.

Ultimately, inequality breeds further conflict, so economic growth is threatened by the simmering

mix of torn social fabric and inter-generational trauma (Ibáñez and Moya, 2010a; Moya, 2018). The number of forcibly displaced individuals doubled in the past decade and low and middle-income countries are the key host economies for those displaced (Ibáñez et al., 2022). Understanding what policies governments in these countries could adopt to improve the socio-economic integration of IDPs is of crucial importance. The positive findings on social integration from this chapter suggest that land restitution may be a post-conflict public policy which supports a sustainable peace and heals the rifts in social fabric civil conflicts generate.

Appendices for Chapter 3

Table 3.A.1: The Effect of Land Restitution with the Nearest Control Group (polynomial)

PANEL A	Association		Association: cooperative		Association of producers		Collective work	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Restituted	0.190*** (0.0543)	0.161*** (0.0560)	0.105** (0.0423)	0.0704* (0.0392)	0.0624* (0.0355)	0.0689* (0.0380)	0.00217 (0.0178)	-0.01000 (0.0168)
Mean Dep Var	0.305	0.305	0.115	0.115	0.121	0.121	0.0872	0.0872
N	4651	4651	4651	4651	4651	4651	4025	4025
N Clusters	236	236	236	236	236	236	232	232
FS F-statistic	529.8	484.8	529.8	484.8	529.8	484.8	948.2	998.7
Controls	No	Yes	No	Yes	No	Yes	No	Yes
FIRST-STAGE RESULTS: Eligible	0.751*** (0.0326)	0.761*** (0.0345)	0.751*** (0.0326)	0.761*** (0.0345)	0.751*** (0.0326)	0.761*** (0.0345)	0.823*** (0.0267)	0.838*** (0.0265)

Note: Standard errors adjusted for clustering by municipality, are in parentheses. Coefficients that are significantly different from zero are denoted by the following system: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. First stage presents the coefficient for micro-focalisation in the reduced form regression for each model. All other coefficients refer to the second stage results of each model and sample specification.

Table 3.A.2: Auxiliary Inputs with Spatial Standard Errors (polynomial)

PANEL A: CREDIT	Applied for a credit		Credit approved		Approved by Banco Agrario		Approved by other bank	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Restituted	0.124** (0.0503)	0.0306 (0.0526)	0.117** (0.0456)	0.0297 (0.0513)	0.0762* (0.0461)	0.0740 (0.359)	-0.0320 (0.0361)	-0.0752 (0.316)
Mean Dep Var	0.191	0.191	0.165	0.165	0.680	0.680	0.250	0.250
N	9938	9353	9938	9353	1636	1562	1636	1562
FS F-statistic	67.52	63.70	67.52	63.70	49.20	69.82	49.20	69.82
Controls	No	Yes	No	Yes	No	Yes	No	Yes
PANEL B: ASSISTANCE	Assistance		Assistance: GD practice		Assistance: soil management		Assistance: commercialization	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Restituted	0.156*** (0.0554)	0.0845* (0.0440)	0.159*** (0.0529)	0.0947** (0.0454)	0.0190** (0.00807)	-0.0135 (0.0133)	0.0181 (0.0318)	0.0441 (0.0348)
Mean Dep Var	0.271	0.271	0.202	0.202	0.0282	0.0282	0.0729	0.0729
N	9938	9353	11612	10922	11612	10922	11612	10922
FS F-statistic	67.52	63.70	51.99	50.49	51.99	50.49	51.99	50.49
Controls	No	Yes	No	Yes	No	Yes	No	Yes

Note: We use spatially adjusted standard errors (with 10km radius). These are presented in parentheses. Coefficients that are significantly different from zero are denoted by the following system: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. First stage presents the coefficient for micro-focalisation in the reduced form regression for each model. All other coefficients refer to the second stage results of each model and sample specification.

Table 3.A.3: Auxiliary Inputs with Spatial Standard Errors (linear)

PANEL A: CREDIT	Applied for a credit		Credit approved		Approved by Banco Agrario		Approved by other bank	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Restituted	0.124** (0.0503)	0.0302 (0.0529)	0.117** (0.0456)	0.0308 (0.0507)	0.0762* (0.0461)	0.0172 (0.0461)	-0.0320 (0.0361)	-0.0215 (0.0389)
Mean Dep Var	0.191	0.191	0.165	0.165	0.680	0.680	0.250	0.250
N	9938	9353	9938	9353	1636	1562	1636	1562
N Clusters								
FS F-statistic	67.52	58.34	67.52	58.34	49.20	60.42	49.20	60.42
Controls	No	Yes	No	Yes	No	Yes	No	Yes
PANEL B: ASSISTANCE	Assistance		Assistance: GD practice		Assistance: soil management		Assistance: commercialization	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Restituted	0.156*** (0.0554)	0.0871** (0.0434)	0.159*** (0.0529)	0.0972** (0.0450)	0.0190** (0.00807)	-0.0128 (0.0134)	0.0181 (0.0318)	0.0429 (0.0348)
Mean Dep Var	0.271	0.271	0.202	0.202	0.0282	0.0282	0.0729	0.0729
N	9938	9353	11612	10922	11612	10922	11612	10922
N Clusters								
FS F-statistic	67.52	58.34	51.99	47.08	51.99	47.08	51.99	47.08
Controls	No	Yes	No	Yes	No	Yes	No	Yes

Note: We use spatially adjusted standard errors (with 10km radius). These are presented in parentheses. Coefficients that are significantly different from zero are denoted by the following system: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. First stage presents the coefficient for micro-focalisation in the reduced form regression for each model. All other coefficients refer to the second stage results of each model and sample specification.

Table 3.A.4: The Effect of Land Restitution on Social Integration (linear)

PANEL A	Association		Association: cooperative		Association of producers		Reciprocal work	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Restituted	0.264*** (0.0971)	0.193* (0.106)	0.201*** (0.0712)	0.168** (0.0791)	0.0867 (0.0634)	0.122 (0.0768)	0.0660 (0.0422)	0.0691 (0.0472)
Mean Dep Var	0.433	0.433	0.121	0.122	0.126	0.127	0.0971	0.0995
N	3283	3125	4242	4031	4242	4031	3667	3477
N Clusters	82	81	84	83	84	83	82	81
F-statistic	76.83	35.94	57.93	21.71	57.93	21.71	80.08	37.91
Controls	No	Yes	No	Yes	No	Yes	No	Yes
FIRST-STAGE RESULTS: Eligible	0.663*** (0.0756)	0.573*** (0.0956)	0.587*** (0.0771)	0.476*** (0.102)	0.587*** (0.0771)	0.476*** (0.102)	0.661*** (0.0739)	0.575*** (0.0933)

Note: Standard errors adjusted for clustering by municipality, are in parentheses. Coefficients that are significantly different from zero are denoted by the following system: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. First stage presents the coefficient for micro-focalisation in the reduced form regression for each model. All other coefficients refer to the second stage results of each model and sample specification.

Table 3.A.5: The Effect of Land Restitution on Social Integration, with Spatial Standard Errors (linear)

PANEL A	Association		Association: cooperative		Association of producers		Reciprocal work	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Restituted	0.271*** (0.0787)	0.113** (0.0552)	0.143*** (0.0519)	0.0428*** (0.0124)	0.0983** (0.0430)	0.0752* (0.0400)	0.0395 (0.0356)	0.0844* (0.0444)
Mean Dep Var	0.250	0.250	0.0774	0.0774	0.0946	0.0946	0.0841	0.0841
N	11612	10922	11612	10922	11612	10922	9904	9319
FS F-statistic	51.99	50.49	51.99	50.49	51.99	50.49	67.26	63.41
Controls	No	Yes	No	Yes	No	Yes	No	Yes

Note: We use spatially adjusted standard errors (with 10km radius). These are presented in parentheses. Coefficients that are significantly different from zero are denoted by the following system: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. First stage presents the coefficient for micro-focalisation in the reduced form regression for each model. All other coefficients refer to the second stage results of each model and sample specification.

Conclusion

This thesis has explored the impacts of formalising property rights over land restituted to people internally displaced by armed conflict. The results suggest that land restitution can help mitigate certain pervasive disadvantages engendered by forced displacement and set former IDPs on a more prosperous path. Although for IDPs to benefit uniformly, implementation must take into account steps to address challenges of mistrust and patriarchal social norms.

The first chapter of this thesis evaluated agricultural investment decisions of formerly displaced households after land restitution, exploring gendered behavioural differences and testing the validity of an implicit assumption in the property rights literature – trust in enforcement. I exploited geospatial variation in policy implementation alongside propensity score matching techniques to obtain causal estimates. The results indicate that in the short-term restitution does encourage significantly more investment in labour inputs, and animal husbandry. I also observe significant improvements in self-reported quality of life as compared to pre-restitution. Land restitution seems to offer the stability and ability to generate wealth and wellbeing – key attributes of a successful post-conflict policy.

I challenged the credibility of trust in property rights in areas of the country where households historically experienced displacement by the state or a perceived state-affiliated actor.¹⁰ I find evidence that agricultural investment decisions are indeed significant in those areas. This suggests that implicitly assuming uniform trust in enforcement may not be judicious when theorising on property rights in post-conflict settings, at least in the short-term.

Moreover, I find evidence that investment behaviours of female-headed households differ from their male counterparts – they are significantly less likely to increase investment in labour inputs on their farm. This seems to be driven by demand-side preferences rather than supply-side restrictions pertinent to gendered obstacles displaced female-headed households face. The analysis also finds that female-headed households leverage their restitution into greater food security, financial stability and integration into the local market economy.

Colombia's most recent Agricultural Census took place in 2014, therefore I was only able to consider agricultural investment effects in the short-term. However, violence perpetrated against local land leaders in Colombia surged from 2016 onwards (UCDP Conflict Encyclopedia, 2024). Extending analysis of agricultural investment decisions of restituted households into the longer

¹⁰In Colombia nearly half of the 87,000 land restitution claims received between 2011 and 2015 report displacement by the state or state-affiliated actors.

term would add to our understanding of the complexity surrounding post-conflict tenure security when conflict resurfaces. Long-term analysis could provide insights into the persistence of mistrust in the state, and how vulnerable rebuilt trust can be if the state appears ineffectual in maintaining the monopoly of violence. The 2016 referendum of the peace deal with the FARC presents an additional lens through which to assess impacts of trust in the state. Indeed, in 2016 the Colombian government submitted the peace agreement with the FARC to a national referendum, which was ultimately rejected by the electorate. The government nonetheless proceeded to sign the peace deal. Areas in which the referendum was resoundingly rejected might view this as undermining their trust in the state. Future research could assess the impact of this on local reception to post conflict policy.

Building on this research, the second chapter addressed another significant gap in the property rights literature by examining intra-household dynamics arising from formally naming women on land titles in post-conflict settings. I examine impacts on human capital investment and women's labour supply decisions, to assess whether this policy might interrupt the multi-generational cycle of poverty set in motion by forced displacement Becker and Ferrara (2019a); Ruiz and Vargas-Silva (2013). I exploited the mandatory nature of a joint titling clause in the post-conflict land reform to assess the mediating effect of women's initial intrahousehold bargaining power on the effects of land titling. Results are tentative but concentrated among households of women who were the most disempowered prior to formal ownership.

Social norms are 'sticky', and I discussed the consequential challenges women face to translate their *de jure* ownership rights into *de facto* changes in their bargaining power. A valuable avenue for future research would involve tracing the enforcement of restituted women's ownership rights in the advent of divorce, as well as inter-generational gendered inheritance patterns. A study with a longer time horizon may more fully capture whether a policy which mandates joint titling can have a multiplier effect by both empowering the mother to earn labour income and altering the preference weighting within the household such that children who have been affected by displacement gain more human capital. If women in a the most vulnerable position exhibit the strongest positive impacts, this adds a strong social mobility impetus to widening these policy changes in post-conflict settings.

The final paper of the thesis explores the effects of restituting land to formerly displaced people in terms of their social integration. It finds evidence of increased integration and trust building between restituted households and other community members, as highlighted by the statistically significant increase in reciprocal farm work, and also greater adherence to community associations. Indeed, restituted households are significantly more likely to be members of groups which support prosperity in rural livelihoods such as associations of producers and cooperatives – essential meeting points for information about local markets as well as accessing finance and risk-pooling. I posit that these indicators of positive reception among host communities are driven by the ability land restitution provides to generate wealth and employment. The inter-related findings of chapters 1 and 3 raise interesting questions for future research regarding the sensitivity of social cohesion to the productivity and economic contributions of restituted individuals in the long-run. Moreover, the social trust literature clearly distinguishes between how conflict affects behaviours

towards ‘in-group’ versus ‘out-group’ members . In future work, it would be meaningful to explore the extent to which land restitution is able to build trust and cooperation with ‘out-group’ households by clearly distinguishing between households who were provided new land, and those who returned to the land they were displaced from.

This research underline the importance of undertaking empirical work into a comprehensive set of outcomes of formerly displaced people upon returning, to form a complete picture of how elements interact.

Structural transformation theory typically associates economic growth with the movement of populations from rural agricultural sectors to urban areas, where higher productivity and innovation drive growth. However, in Colombia’s post-conflict context, the government has adopted a policy encouraging the return of IDPs to rural agricultural land. A promising avenue for future research is to explore the welfare effects on society of this policy that can be termed ‘reverse structural transformation’. Colombia’s reparation law for victims of the conflict, offers land restitution to certain IDPs and financial reparations to others depending on the year they were displaced. It would be interesting to ascertain whether financial reparations, which are fungible and allow individuals the freedom to choose between staying in urban areas or returning to rural ones, would on average be more efficient in maximizing welfare than restituting land. On the one hand, there are reasons to assume IDPs may prefer to remain in urban areas, including that skill loss of land-specific knowledge increases the longer IDPs have been off land, and the next generation may only have known urban life. On the other hand, findings from Chapter 2 of this thesis suggest that women with low intra-household bargaining power may have relatively higher welfare gains from land titling. Land, less liquid than money, is harder for other household members to capture, which may confer on women greater control over their economic resources. The research could be complemented by exploring the macroeconomic implications of reverse structural transformation.

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